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Alcohol, Tobacco, and Other Drug Use among Adolescents:

Examining Sensation Seeking, Sport,

and Psychosocial Mediators

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Alcohol, Tobacco, and Other Drug Use among Adolescents: Examining Sensation Seeking, Sport, and Psychosocial Mediators

by

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Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

In Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

August 2007

This dissertation

is dedicated to

my loving husband, Brad,

the future Baby H,

and my loving parents,

Lana and Ernie Miller.

Acknowledgements

I would like to express my gratitude to my Advisor, Fred L. Peterson, Ph.D., and to my dissertation committee members, John B. Bartholomew, Ph.D., Susan N. (Tasha) Beretvas, Ph.D., Alexandra Loukas, Ph.D., and Charles N. (Chuck) Roper. I greatly appreciate your guidance, inspiration, and expertise in shaping my academic career. I would also like to express my gratitude to the Department of Kinesiology and Health Education at the University of Texas at Austin. I appreciate the opportunity I was given to teach during my graduate schooling, both for the experience, and for the employment opportunity of graduate school funding. Lastly, I appreciate the research consultants in the Information Technology Services Department at the University of Texas at Austin, in particular, Michael Mahometa, Ph.D., Nancy Heger, Ph.D., and Shanna Smith, Ph.D. Your guidance and patience were invaluable.

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Publication No._____

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The University of Texas at Austin, 2007

Supervisor: Fred L. Peterson

The leading cause of death for 15-20 year olds in the United States is unintentional injury. For this population, these injuries are often caused by motor vehicle accidents, alcohol and/or drug use, or a combination thereof. Sensation seeking is an internal drive to seek exciting and novel experiences. Congruous with normative developmental processes, adolescents are more likely to have a higher psycho-physiological drive towards sensation seeking than are younger children or adults. High sensation seeking is one of the risk factors for alcohol, tobacco, and other drug (ATOD) use. Other risk factors include: lack of adult-supervised time, high negative affect, and favorable attitudes and subjective norms regarding ATOD use. Sport participation addresses many of these risk factors. Sport and extracurricular

activity participation have been examined in relation to ATOD use. However, the relationship between sport and ATOD use remains somewhat equivocal.

This study aimed to determine the direction of the relationship between sport participation and ATOD use, and to elucidate putative, psychosocial mediators and moderators. Students in health classes (n=239, average age 16.06)) from three high schools in one suburban, Central Texas school district were given an anonymous survey regarding ATOD use, extracurricular activities, affect, attitudes, sensation seeking, social support, and subjective norms. Regression, ANOVA, and path analysis were the statistical methods employed. Consistent with previous research, favorable attitudes and subjective norms towards ATODs had a strong, positive effect on ATOD use. Sport participation was examined as moderator in the relationship between sensation seeking and ATOD use. An interaction between sport and ATOD use with sensation seeking was supported by the data. However, mean sensation seeking on the Arnett Sensation Seeking Scale was low for this sample, compared with that of other adolescent samples. Mean ATOD use was lower for sport participants compared with all other students, but not compared with extracurricular activity participants.

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Chapter 1

Introduction

Purpose

The purpose of this study was to elucidate the relationships between alcohol, tobacco, and other drug (ATOD) use, psychosocial determinants of ATOD use, and sport participation among adolescents. The direction of the relationship between sport participation and ATOD use is the primary question of interest: i.e., Is sport participation a positive or negative influence on ATOD use? Additionally, the interaction between sensation seeking and ATOD use in relation to sport participation was examined: i.e., is sport participation a moderator in the relationship between sensation seeking and ATOD use? Lastly, in order to better understand the mechanisms by which sport affects ATOD use, the explanatory effects of psychosocial determinants of ATOD use were examined in the relationship between sport participation and ATOD use: i.e., do attitude, negative affect, social support, and subjective norms mediate the relationship between sport participation and ATOD use?

Background

Mortality and Morbidity

The leading cause of death for adolescents is a preventable, external cause. For 15-19 year olds, the leading cause of mortality is unintentional injuries. Over 50% of these injuries occur from motor vehicle accidents (National

Center for Health Statistics, 2005). Over 25% of adolescents killed in motor vehicle accidents had blood alcohol levels over the legal limit in most states (0.08 g/dl) (National Highway Traffic Safety Administration, 2003). Adolescents are the most likely age-group to drive after using alcohol or drugs (Jonah & Dawson, 1987). The combination of alcohol and drug use and motor vehicles is clearly deadly for individuals of any age. The Centers for Disease Control has identified reduction of fatalities among adolescents as an objective, and motor vehicle fatalities as a primary, targeted behavior for Healthy People 2010 (Objectives 16-3b and 26-1a through 1d) (Centers for Disease Control, 2000-2006).

While alcohol and drug-related motor vehicle crashes among adolescents are a significant public health issue, adolescent alcohol, tobacco and other and drug (ATOD) use is, itself, a public health issue. An emergency room physician determined that over one-third of emergency room visits by adolescents were caused by alcohol alone (Zautcke, Furtado, Morris, Uyenishi, & Stein-Spencer, 2005). According to findings from the 2003 Youth Risk Behavior Survey (YRBS), which biannually surveys approximately 15,000 high school students ages 14-18 on a variety of health-related behaviors, approximately 45% of high school students had consumed one or more drinks on one or more of the past 30 days. Approximately 29% reported engaging in episodic, heavy drinking, which is five or more drinks in a row, on one or more of the past 30 days. Data from the most recent survey indicate approximately

11% of 14-15 year olds and 19% of 16-17 year olds reported ever having used an illicit drug. Approximately 20% of high school seniors reported using marijuana in the past 30 days (National Center for Health Statistics, 2005). The objectives of Healthy People 2010 include several behavioral objectives regarding the reduction of alcohol and other drug use among adolescents (Objectives 26-9 through 26-17) (Centers for Disease Control, 2000-2006).

Smoking tobacco kills few adolescents. However, approximately 500,000 Americans die annually from smoking-related causes (Centers for Disease Control, 2002). From 1998 to 2004, 93% of cigarette manufacturers in the United States had raised nicotine content in cigarettes by 10% (Massachusetts Department of Public Health, 2006). Adolescents often become dependent upon nicotine before they have established a daily habit of smoking (University of Massachusetts Medical School, 2000). Despite enforcement of tobacco-purchasing age-limits in most states, young adults are the fastest growing segment of the smoking population in the U.S. (The University of Michigan, 2001). Healthy People 2010 includes objectives to target the incidence and prevalence of adolescent tobacco-users (Objectives 27-2 through 27-4) (Centers for Disease Control, 2000-2006).

Risk-Taking

Conversely, a large proportion of deaths caused by unintentional injuries are unrelated to ATOD use. In fact, approximately 60% of unintentional

injuries are not caused by individual ATOD use. Deaths not caused by individual ATOD use may be related to sensation seeking. Sensation seeking is a personality trait identified by Marvin Zuckerman that describes an individual's propensity to seek novel experiences.

> Sensation seeking is a trait defined by the seeking of varied, novel, complex, and intense sensational experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experiences (Zuckerman, 1994).

An individual identified as a high sensation seeker is more likely to engage in risk-taking behavior (Newcomb & McGee, 1991; Zuckerman, 1994). In general, risk-taking behavior is a normative behavior by which many adolescents individuate (Erickson, 1968). However, risk-taking behavior may be adaptive or maladaptive in nature. A broad definition of risk is any action for which there is potential for failure or success as an outcome (Peterson, 2004). Maladaptive risk-taking behavior, such as that which causes impairment, injury, or death, is not normative and is indubitably undesirable. Adolescents who are high in sensation seeking engage in more risk-taking behavior than those who are low in sensation seeking (Newcomb & McGee, 1991). Additionally, "high sensation seekers appraise risk as lower than do low sensation seekers even for activities they have never tried" (Horvath & Zuckerman, 1993). High sensation seeking among adolescents may be due to physiological differences in terms of drive and brain chemistry as compared with adults (Zuckerman, 1990).

Therefore, high sensation seeking may lead, directly, through high-risk behavior, or indirectly, through ATOD use and consequent high-risk behavior, to adolescent mortality. Adler's model of health-related behaviors links to morbidity and mortality through psychophysiological mechanisms, health related behaviors, and individual dispositions (Adler & Matthews, 1994). Adolescent mortality by motor vehicle crashes may, in part, be due to the psychophysiological predisposition of this cohort to engage in maladaptive risks, i.e. high sensation seeking. For example, adolescents are the least likely age group to wear seat belts. Adolescents are more likely to drive above the posted speed limit, to make illegal turns, and to ride with an intoxicated driver. In 2003, approximately 75% of adolescent drivers killed in a motor vehicle crash were not wearing safety belts (National Highway Traffic Safety Administration, 2004).

Adaptive risk-taking behaviors do not cause harm to the individual or others. In fact, adaptive risk-taking is a desirable manifestation of individuation (Erickson, 1968). Sport participants are often high sensation seekers (Rosenbloom, 2003). Sport may serve as an adaptive risk for high sensation seekers, which could, in turn, reduce ATOD use. Some research indicates a negative relationship between sport participation and ATOD use in adolescents (Harrison & Narayan, 2003; Kulig, Brener, & McManus, 2003; Substance Abuse and Mental Health Services Administration, 2002). There are several mechanisms by which sport may serve as a protective factor.

Firstly, exercise decreases negative affect (Bartholomew, Morrison, & Ciccolo, 2005; Blumenthal, 2000; Petruzello, Landers, Hatfield, Kubitz, & Salazar, 1991); exercise is a major component of sport. Additionally, organized sport participation increases time spent with a significant adult, increases supervised time, and simply increases time that precludes ATOD use. High negative affect (T. R. Collingwood, 1997), not having a relationship with a significant adult (Williams, Epstein, Botvin, Schinke, & Diaz, 1998), and having unsupervised time after school (Spooner, 1999) are risk-factors for ATOD use. Thus, sport participation may be an adaptive outlet that satisfies the psychophysiological drive many adolescents have for risk-taking behavior.

On the contrary, some research indicates that sport has a positive relationship with ATOD use (Gonzalez, Field, Yando, & Gonzalez, 1994; Lorente, Souville, Griffet, & Grélot, 2004). Sport participation may provide a social forum that promotes ATOD use. Having peers who use ATODs robustly predicts ATOD use among adolescents (Capuzzi & Lecoq, 1983; Windle, 2000). However, the temporal structure of the peer use/individual use remains equivocal. That is, do individual adolescents choose peers who use drugs, or do peers influence the use by the individual? Additionally, extracurricular activities in general, have been demonstrated to be protective (Eccles & Barber, 1999; Eccles, Barber, Stone, & Hunt, 2003). Sport is a unique type of extracurricular activity. Therefore, this study seeks to elucidate the relationship between sensation seeking, sport participation, and ATOD use,

as well as to investigate the mechanisms by which this relationship may be explained.

Summary

Approximately 75% of adolescent deaths are due to maladaptive risk-taking behavior. Sensation seeking predicts ATOD use in adolescents. It is unclear as to the nature of sport either as an adaptive risk-taking behavior or as a determinant of ATOD use. Sport may serve as a protective factor against ATOD use by moderating the relationship between sensation seeking and ATOD use in adolescents. The Centers for Disease Control's comprehensive program, Healthy People (HP) 2010, has identified increasing physical activity for all Americans as one of the objectives. Specifically, for adolescents, the recommendation is to

> Increase the proportion of adolescents who engage in vigorous physical activity that promotes cardiorespiratory fitness 3 or more days per week for 20 or more minutes per occasion (Centers for Disease Control, 2006).

For all adolescents, there are physical benefits of physical activity, an improvement in cardiovascular health. Some adolescents, however, particularly high sensation seekers, may reap an additional benefit from engaging in formal physical activity through sport participation. Because another goal of HP 2010 is to reduce ATOD use for adolescents, this study combines HP 2010 goals to examine potential benefits to adolescent health. Specifically, Objectives 26 and 27 aim to reduce adolescent tobacco and other

drug use and delay the age of first use. Objective 26 also specifies reduction in "consequences of motor vehicle accidents" (Centers for Disease Control, 2006).

The results from this study will provide insight for prescribing physical activity to adolescents. The examination of the summation and interaction of psychosocial factors relevant to adolescents will help health educators determine who may benefit from participation in a formal sport team, and who may benefit from informal physical activity.

Research Questions and Hypotheses

Research Question 1: a) What is the direction of the relationship between sport participation and ATOD use in adolescents? **b)** Are there differences in ATOD use when comparing groups of adolescents by type of extracurricular activity participation (no activity, extracurricular, sport, or both)?

Hypotheses 1 - 3

1. ATOD use will be higher for individuals who do not participate in any extracurricular activities (including sport) than for individuals who participate in any extracurricular activity.
2. There will be a difference in ATOD use for sport participants versus non-sport extracurricular activity participants.
3. There will be a relationship between sport participation and alcohol and drug (ATOD) use. ATOD use will be higher for individuals who do not participate in sport than for individuals who participate in sport.

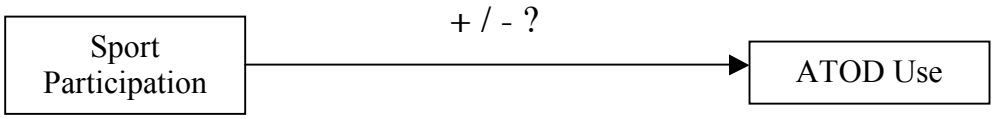


Figure 1a: Research Question 1a, Direction of Relationship between Sport and ATOD Use

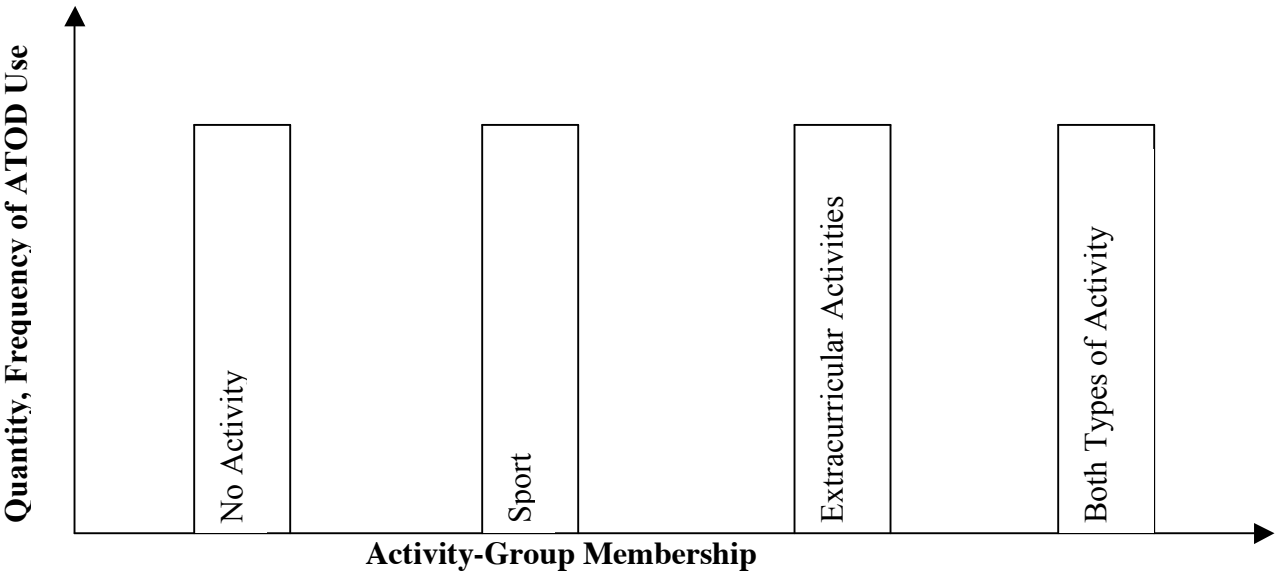


Figure 1b: Research Question 1b, Differences in ATOD Use Comparing Activity Groups

Research Question 2: Sensation seeking is a well-known predictor of ATOD use among adolescents. Does sport participation moderate the relationship between sensation seeking and ATOD use in adolescents?

Hypotheses 4-5

4. Sensation seeking will be lower for individuals who do not participate in sport than for individuals who participate in sport.

5. Sport participation will moderate the relationship between sensation seeking and ATOD use.

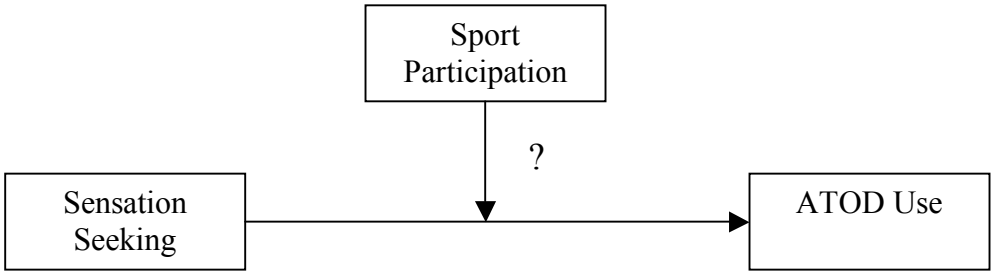


Figure 2: Research Question 2, Direct Effect of Sensation Seeking on ATOD Use and Interaction Effect of Sport Participation with Sensation Seeking on ATOD Use

Research Question 3: What are the explanatory effects (if any) of the psychosocial determinants of ATOD use in the relationship between sport participation and ATOD use? That is, do attitude, negative affect, social support, and/or subjective norms mediate the relationship between sport participation and ATOD use in adolescents?

Hypotheses 6-7

6. Negative affect will be higher for individuals who do not participate in sport than for individuals who participate in sport.

7. Attitudes, social support, subjective norms, and negative affect will mediate the relationship between sport participation and ATOD use.

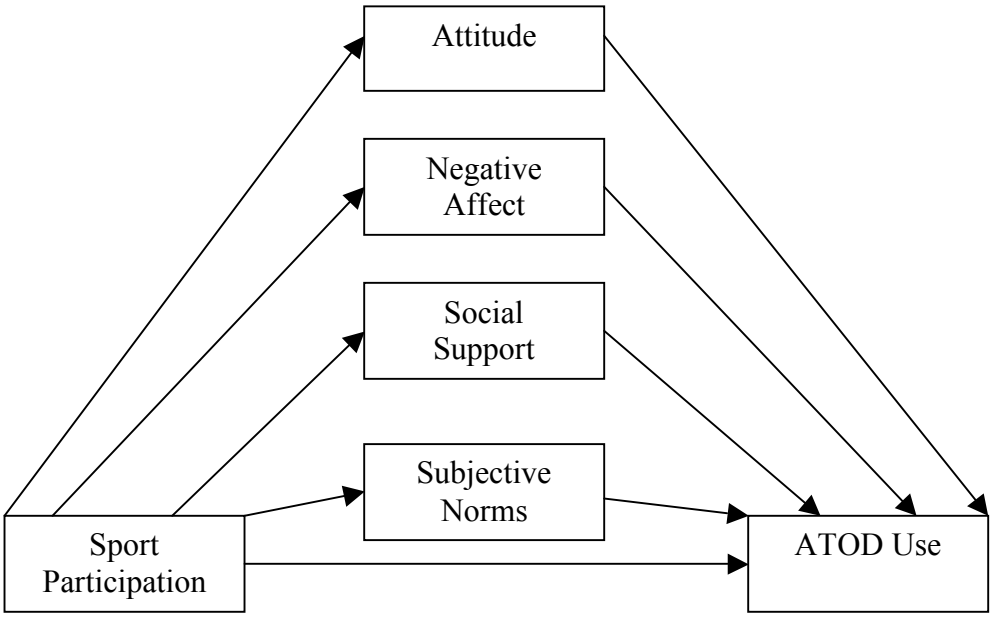


Figure 3: Research Question 3, Explanatory Effects

Significance of the Study

Researchers have identified many determinants of ATOD use for adolescents. However, researchers have not conclusively determined the direction of the influence of sport participation on ATOD use among adolescents. In other words, some researchers have determined a negative relationship between sport and ATOD use (sport as a protective factor or beneficial determinant), while other researchers have determined a positive relationship (sport as a risk factor or detrimental determinant). Additionally, moderators and mediators between the determinants and the outcome (ATOD use) remain equivocal or unexamined. This study aimed to determine the direction of the relationship and to elucidate moderators and mediators in the relationship between sensation seeking and ATOD use in adolescents.

Physical activity programs have been cut nationwide, while the prevalence of ATOD use remains constant or has increased for certain cohorts and certain substances. The mechanisms identified in this study may be used to make public health recommendations for extracurricular activity participation for adolescents. This study adds to the body of literature that enlightens adolescent health education practices for primary, secondary, and tertiary prevention of maladaptive risk-taking behavior.

Chapter II

Review of Literature

Introduction

Alcohol, tobacco, and other drug (ATOD) use remains a major health problem for adolescents in the United States (Centers for Disease Control, 2003b). Sensation seeking has been identified as a risk factor for ATOD use. Sport participants are often high sensation seekers. Additionally, negative affect has been identified as a risk factor for ATOD use. Physical activity and exercise training have been shown to reduce negative affect. A major component of most sports is physical activity. Sport participation incorporates other well-known protective factors against ATOD use such as adult-supervised time and a relationship with a significant adult. Research regarding the relationship between sport participation and ATOD use, however, has yielded equivocal results. Sport participation has not been examined as a moderator in the relationship between sensation seeking and ATOD use. This study examines sensation seeking as a moderator as well as other potential mediators and moderators in the relationship between sport participation and ATOD use.

Rationale for Examining Risk and Protective Factors

In the broad context of disease, a risk factor increases the probability that an individual will contract the disease or incur its negative effects. In the

broad context of behavior, a risk factor is a psychological, biological, environmental, and/or social attribute that is harmful to the individual and facilitates a negative outcome (Clayton, 1992). In the specific context of ATOD use, risk factors increase the probability the individual will engage in ATOD use. Having one or more risk factors places an individual "at risk." According to a report by the Carnegie Council for Adolescent Development, approximately 50% of adolescents in the United States, particularly ethnic minorities, are at risk for ATOD use (Carnegie Council on Adolescent Development, 1995). An especially problematic health risk behavior for adolescents is binge drinking. Binge drinking is defined as consuming five or more alcoholic drinks in a row (National Center for Health Statistics, 2005).

In contrast, a protective factor decreases the probability that a risk factor will cause negative effects or outcomes. In other words, protective factors moderate the impact of a risk factor on the outcome (Conrad & Hammen, 1993). Protective factors are associated with sustained, adequate functioning (Gest, Neemann, Hubbard, Masten, & Tellegen, 1993). Well-known protective factors against ATOD use in adolescents are having a relationship with a significant adult, spending after school time in activity (Gilligan, 1999; Griffin, Botvin, Scheier, Diaz, & Miller, 2000; Oman et al., 2004; T. A. Wills & Yaeger, 2003), regarding ATOD use as undesirable (Ritt-Olson et al., 2004), having peers who do not use ATODs, and having a

perception that peers view ATODs unfavorably (Wilks, Callan, & Austin, 1989).

Alcohol, Tobacco and Other Drug (ATOD) Use

Prevalence

Extensive data have been collected regarding ATOD use in adolescents. The National Survey on Drug Use and Health is funded by the Substance Abuse and Mental Health Services Administration, a federal government agency, and collects telephone-survey data from adolescents on a variety of health behaviors. ATOD use prevalence data are presented in *Table 1* (National Center for Health Statistics, 2005). Additionally, ATOD use trends from 1980-2004 are presented in *Figure 1*. While the incidence of ATOD use has declined, the prevalence of each substance remains problematic. For example, approximately 25% of high school seniors have smoked cigarettes in the past 30 days.

Table I: Past Month ATOD Use for Adolescents

Past Month Use	**Tobacco**	**Marijuana**	**Alcohol**	**Binge Drinking**
High School Seniors	25%	20%	48%	30%
	Any Illicit Drug Use		**Recreational Use of Psychotherapeutic Drug**	
12-17 year olds	12%		9%	

(National Center for Health Statistics, 2005)

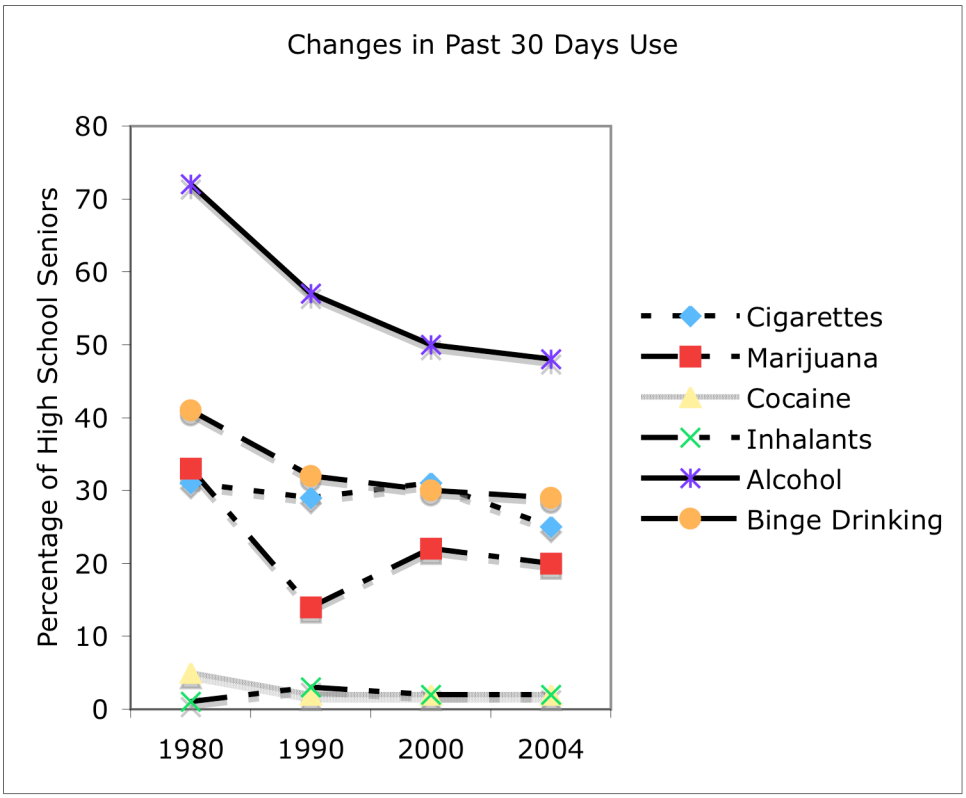


Figure 4: Changes over 24 years in "Past 30 Days" ATOD Use for High School Seniors (National Center for Health Statistics, 2005)

Individual-Level Risk Factors for ATOD Use

There are many, well-known risk factors for ATOD use in adolescents. Some risk factors are completely beyond the control of the individual yet persist in affecting the individual. Demographic risk factors have been identified. Sex has been identified as a risk factor. Males have a higher prevalence for alcohol use compared with females (Yang, Yang, Liu, & Ko, 1998; Young et al., 2002). In a study of 1,000 adolescents, males were twice as likely to drink alcohol and 4 times as likely to use marijuana (Oldenburg &

Lemon, 1992). Similarly, in a sample of over 2,300 middle and high school students, males were determined to be more likely to use alcohol and drugs compared with females (Challier, Chau, Prédine, Choquet, & Legras, 1999). Adolescent females, however, are the fastest growing population of tobacco users in the United States (Centers for Disease Control, 2003a). High school females were found to have higher rates of tobacco use compared with males in two similar studies (Challier et al., 1999; Young et al., 2002).

Another demographic risk factor for ATOD use in adolescents is age. Age of first use was found to be a significant predictor of future ATOD use. That is, the younger the age of first use, the greater the likelihood of current use. Additionally, ATOD use increases as a function of age (P. Wu, Hoven, & Fuller, 2003) until use peaks at age 18 (Kandel & Logan, 1984).

Lastly, ethnicity has been examined as a demographic risk factor for ATOD use in adolescents. Despite difficulties researchers have in quantifying ethnicity, ethnicity has, however, been identified as a risk factor (Spooner, 1999). Compared with being in an ethnic minority, being Caucasian and/or being a member of an ethnic majority has been shown to be a risk factor for ATOD use (Maag & Irvin, 2005; Weden & Zabin, 2005).

Individual-Level Risk Factors for ATOD Use: Biological

One category of theories identified by researchers that describe adolescent ATOD use are biogenetic-dispositional models (Windle, 2000). That is, there are individual determinants, which are not controlled by the individual, that are congenital influences on personality and behavior. Sensation seeking is viewed as partially, if not entirely, a biologically determined disposition (Zuckerman, 1994). Sensation Seeking has been identified a risk factor for ATOD use in adolescents. High sensation seeking adolescents engage in more ATOD use than their lower sensation seeking peers (Greene, Kromar, Walters, & Rubin, 2000; Gullone & Moore, 2000; Newcomb & McGee, 1989). High sensation seekers appraise risk as "less risky" than do low sensation seekers (Horvath & Zuckerman, 1993). A longitudinal study of over 500 adolescents collected ATOD use data and a measure of sensation seeking 3 times in 5 years. Licit and illicit drug use both were highly correlated ($R^2 \geq 0.5$) with sensation seeking (Newcomb & McGee, 1991).

Sensation seeking has been examined both as a single construct and by its subcomponents, one of which is impulsivity. Impulsivity is a personality characteristic and a subscale included in Zuckerman's psychometric assessment and Arnett's concept of sensation seeking (Arnett, 1994; Zuckerman, 1994). Impulsivity is the degree to which an individual takes action without consideration. In a 1997 study of early adolescents, high impulsivity (as measured with Eysenck's Impulsivity Scale from the Junior

Personality Questionnaire) (Eysenck & Eysenck, 1975) was associated with favorable attitudes towards ATOD use (Francis, 1997).

A mechanism by which high impulsivity is a risk factor is that highly impulsive adolescents "may experience less parental support and develop a repertoire of less effective coping strategies" (Siqueira & Diaz, 2004). Therefore, not only is the highly impulsive adolescent making poor choices, but his support system (or lack thereof) at home and/or school continues to foster maladaptive risk-taking. These individuals resort to non-normative peer choice as maladaptive risk-taking and ATOD use as emotion-focused coping (T. Wills, Duhammel, & Vaccaro, 1995).

Individual-Level Risk Factors for ATOD Use: Psychological

Many psychological risk factors have been identified. The theoretical framework for these determinants is "affect regulation" (Windle, 2000). In other words, ATOD use is an acute means to moderate one's undesirable emotions, via emotion-focused coping (Lazarus & Folkman, 1984). Negative affectivity (Colder & Chassin, 1997; Labouvie, Padina, White, & Johnson, 1990; Myers, Gregory, Tomlinson, & Stein, 2003; Tschann et al., 1994), dysphoria (Locke & Newcomb, 2001), anxiety (Howard, Walker, Walker, Cottler, & Compton, 1999), depression (E. Goodman & Huang, 2002), hostility and antisocial behavior (Uihlein, 1994), and boredom (Franques et al., 2003; Gorsuch & Butler, 1976; Siqueira & Diaz, 2004) have been shown to predict

ATOD use in adolescents, both in the general population and clinical populations. In the 1997 Colder and Chassin study, adolescents were assessed using a modified Positive and Negative Affect Scale (PANAS) that asked participants to generalize how they felt for the past 3 months. (The original PANAS is designed to assess positive and negative affect, acutely). This study also assessed impulsivity, which is a component of sensation seeking. Adolescents who were high on impulsivity and high on negative affect had higher rates of alcohol use than those with low impulsivity and low negative affect. Additionally, adolescents with either high negative affect or high impulsivity, but not both, were more likely to use alcohol than those with only one of the risk factors (Colder & Chassin, 1997).

Dysphoria and depression have been examined in adolescents. Relapse rates were examined in a sample of adolescent alcohol and drug treatment patients. The rate and severity of depression for those patients who had not relapsed 1, 6, and 12 months post discharge, did not differ from rates and severity in the general population (Hatsukami & Pickens, 1982). The relationship between dysphoria and ATOD use is complex. According to Goodman, ATOD use in adolescents is triggered by a combination of psychic pain and an inability to cope with the pain (J. Goodman, 1972). Because many adolescents expect the outcome of ATOD use to be decreased discomfort and/or emotional pain, the adolescent's experience of a negative psychological state, combined with favorable attitudes towards ATOD use, were found

robustly to determine behavior (Capuzzi & Lecoq, 1983). For adolescents with dysphoria, favorable attitudes towards ATOD use and outcome expectancies that ATOD use will alleviate the dysphoria, ATOD use is higher compared with adolescents that do not meet those conditions (Shoal & Giancola, 2001). The relationship between dysphoria and ATOD use is also reciprocal (J. Goodman, 1972). While dysphoria often precedes ATOD use, ATOD use is often followed by dysphoria (Capuzzi & Lecoq, 1983; Holahan, Moos, Holahan, Cronkite, & Randall, 2001; Shoal & Giancola, 2001). It is well-known that alcohol is a depressant, and rebound and withdrawal symptoms for many stimulant-type drugs include dysphoria (National Institutes on Drug Abuse, 2007).

Attitudes (which includes behavioral belief), evaluation of behavioral outcomes (outcome expectancies), and subjective norms are prominent constructs from health education theory. Research based in the Theory of Planned Behavior (Ajzen, 1991) has demonstrated attitudes, subjective norms regarding ATOD use, and past ATOD use predict current ATOD use in adolescents. Having positive attitudes regarding maladaptive risk-taking behaviors and having previously engaged in those behaviors are risk factors for ATOD use. In a 1999 study of high school students, self-reported past alcohol consumption was a robust predictor of current, self-reported present alcohol consumption (Conner, Warren, Close, & Sparks, 1999). Similarly, both 7th grade alcohol use and positive alcohol expectancies, independently predicted

senior-year use in a longitudinally designed study of over 1,000 adolescents (Griffin, Botvin, Epstein, Doyle, & Diaz, 2000). Having positive attitudes towards alcohol predicted alcohol use in a single sample of approximately 200 high school students (Pfingsten, 1994). Having a favorable attitude towards ATOD use predicted current ATOD use. Researchers in a 2003 cross-sectional study of approximately 500 adolescents found an interaction between age and attitude: attitude towards ATOD use was more favorable in older adolescents (high school-aged) compared with younger (middle school-aged) adolescents (Musher-Eizenman, Holub, & Arnett, 2003).

Interpersonal-Level Risk Factors for ATOD Use: Social

Another construct from the Theory of Planned Behavior, subjective norms regarding ATOD use have been researched as predictors (Ajzen, 1991). Subjective norms are the views of an individual regarding his/her peers' behavior and attitudes. While subjective norms are certainly an individual level determinant, subjective norms could be viewed as the first steps on the path of influence by peers and family. The third and final framework by which adolescent ATOD use is studied and classified is via "socialization models" of adolescent ATOD use (Windle, 2000).

The perception held by adolescents that their peers have favorable beliefs about ATOD use predicted individual ATOD use in a cross-sectional study of over 200 high school students (Robin & Johnson, 1996). Subjective

norms regarding alcohol consumption accounted for 33% of the variance in predicting intention to drink alcohol for a sample of 122 university students (O'Callaghan, Chant, Callan, & Baglioni, 1997). That is, the combination of the belief that their peers use ATODs and the belief that their peers have favorable opinions regarding ATOD use, predicted individual ATOD use. In a 1989 study of adolescents in Great Britain perceptions regarding peers' drinking behavior were a significant predictor of individual drinking behavior. The relationship between subjective norms and drinking behavior was found to be stronger for girls than for boys in a 1989 study of high school students (Wilks et al., 1989).

Subjective norms for ATOD use are related to peer-choice for adolescents. There is a common misperception by some parents and school officials that so-called "peer pressure" is a strong influence over individual behavior (Kochis, 1995). On the contrary, adolescents who are ATOD users often choose peers who are also ATOD users (Swadi, 1999). It is not the case that the individual's peers attempt to verbally or otherwise persuade him to do something against his will. Oetting and colleagues describe Peer Cluster Theory as a psychosocial model that is comprised of several socialization factors. The adolescent's decision to use ATOD is filtered through his peer cluster. The peer cluster is a small, very cohesive group of friends with whom he chooses to associate based on key influences. The peer cluster is influenced by the strength of his family, family norms regarding ATOD use,

and religious identification. In other words, the adolescent chooses his peers based on the degree to which their behavior agrees with his values and ideals (Oetting & Beauvais, 1987).

Interpersonal-Level Risk Factors for ATOD Use: Environmental

On the interpersonal level of influence, as subjective norms predict individual use, peer use also predicts individual use. Sibling substance use was found to be a robust predictor of adolescent substance use in a 2000 study (Windle, 2000). The author discerns it is through the mechanism of imitation and role-modeling that parent, sibling, and peer use are risk-factors for individual use among adolescents (Windle, 2000). This "socialization theory" of adolescent ATOD use has been demonstrated by studies that found the sheer number of ATOD-using peers with whom an individual adolescent associated predicted adolescent ATOD use (L. R. Rosenfeld, Richman, & Bowen, 1998; T. A. Wills & Yaeger, 2003).

Socioeconomic Status (SES) has been identified as a risk factor for ATOD use among adolescents. In particular, low SES has been identified as a risk factor (Harrell, Bangdiwala, Deng, Webb, & Bradley, 1998; P. Wu et al., 2003). Logistic regression models were used to investigate the relationship between adolescent smoking status (yes/no) and parental SES. As SES decreased, adolescent smoking increased (Soteriades & DiFranza, 2003). Similarly, a study of 6th graders indicated that low SES was associated with a

greater number of other risk factors for ATOD use than was high SES (Tatchell, Waite, Tatchell, Durrant, & Bond, 2004).

Employment status is a component often used to calculate SES. Adolescents who are employed during the school year were at greater risk for ATOD use than those not employed (L. Wu, Schlenger, & Galvin, 2003). A 1991 study of over 7,000 6th through 12th graders found students who were employed had significantly higher ATOD use than their peers who were not employed. Approximately 70% of high school students who were employed were currently using tobacco, alcohol, and/or marijuana. Although individual SES was not reported, it is reasonable to assume the families of the employed students were lower than average SES. Additionally, the employed adolescents themselves may have had more money to spend on ATODs (Thompson, Rice, Cooley, & Van Nelson, 1991).

High SES has also been shown to be a risk factor for ATOD use among adolescents. A study that compared inner-city, low SES high school students with suburban, high SES high school students found ATOD use was much higher for the suburban, high-SES population (S. S. Luthar & D'Avanzo, 1999). Similarly, lack of parental emotional support and simply lack of monitoring are risk factors for ATOD use (Shaw, 2006). In many instances, adolescents with parents with higher SES may not be spending as much time with their parents as adolescents with parents with lower SES (Thielemann, 2005). In contrast, adolescents in low SES homes may have been identified

as being at risk and have been engaged in a prevention program (Thielemann, 2005). High SES was shown to be predictive of anxiety and depression, however, when comparing high SES with low SES adolescents. A 2003 study examined high school males referred to school counseling found those who scored higher on measures of anxiety and depression were from the highest SES brackets (Siegel & Ehrlich, 1989). Again, high SES adolescents may simply have the means to purchase ATODs, while lower SES adolescents do not (Swanson, Linskey, Quintero-Salinas, Pumariega, & Holzer, 1992).

Individual-Level Protective Factors against ATOD Use

The relationship between ethnicity and ATOD use has been examined. Being a member of an ethnic minority has consistently been shown to have a negative relationship with ATOD use. However, members of ethnic minorities commonly have at least one risk factor for ATOD use. Researchers postulate that identification with and pride surrounding a particular race are the mechanisms by which ethnicity is protective (Brook & Pahl, 2005; Marsiglia, Kulis, Hecht, & Sills, 2004; McCambridge & Strang, 2005; Oman et al., 2004).

As previously mentioned, research based on the Theory of Planned Behavior (Ajzen, 1991) has demonstrated adolescent attitudes regarding ATOD use predict use. Regarding ATOD use as aversive is protective against ATOD use. Having a hopeful attitude regarding the future has been shown to be protective against ATOD use in adolescents (Siqueira & Diaz, 2004).

Additionally, the perception that one accomplishes tasks that are valued by oneself and others is protective (Siqueira & Diaz, 2004).

Much in the way adolescents who are using ATOD chose peers who are ATOD users, non-users chose non-using peers. Adolescents who report that their friends do not use ATODs, report that they themselves are not using (Wilks et al., 1989; T. A. Wills & Yaeger, 2003). Possessing social competencies such as the ability to form bonds is protective (Rutter, 1979). Adolescent ATOD users often lack skills to form social bonds (Aseltine & Gore, 2000).

Interpersonal-Level Protective Factors: Environmental

On the interpersonal level of behavioral influence, social support is a well-known protective factor for adolescents (Dean & Ensel, 1982; Ganster & Victor, 1988). Complex emotional relationships with parents, teachers, and mentors, in general, have been shown to be protective for adolescents. Adolescents who report even moderately satisfying emotional and informational social support with adults have fewer undesirable outcomes than do adolescents who report low social support from adults (L. R. Rosenfeld et al., 1998). A longitudinal study published in 2006 found, even when controlling for age of first alcohol use, adolescents with a lack of parental emotional support early in life had more alcohol abuse problems later in life

compared with adolescents who received early, parental emotional support (Shaw, 2006).

Possibly of equal importance to complex relationships with adults, is the protective benefit of simply having adult supervision. Simply spending time being supervised by an adult is protective against ATOD use (Carnegie Corporation of New York, 1992). Adolescents who report positive relationships with a member of their family, a teacher, or a coach, report less ATOD use than those who do not report those relationships as being part of their lives or as being positive (Gilligan, 1999; Griffin, Botvin, Scheier et al., 2000; Oman et al., 2004; T. A. Wills & Yaeger, 2003). Gilligan stresses the importance of adolescents having an adult who is, in effect, an advocate. This advocate may act in any number of roles, but regardless of the advocate's role in the adolescent's life, the advocate serves as a buffer against ATOD use (Gilligan, 1999). Additionally, having a mother who is a stay-at-home mother has been shown to be protective (Challier et al., 1999). Having a mother who is able to stay at home may be indicative of high SES. In other words, the effect of having a stay-at-home mother may moderate the relationship between SES and ATOD use.

Extracurricular Activities

Participation in extracurricular activities, in general, has been shown to negatively predict ATOD use in adolescents (Landers & Landers, 1978;

Murray Nettles, Mucherah, & Jones, 2000; Prelow & Loukas, 2003; Youniss, McLeillan, & Yates, 1997). A longitudinally designed study by Eccles and Barber examined extracurricular activities by categories – prosocial, team sports, school involvement, performing arts, and academic clubs. All the activities except team sports were protective against ATOD use for a sample of over 1,200 high school students over a six-year period beginning in 6th grade (Eccles & Barber, 1999). Other researchers have indicated extracurricular activity participation has a negative dose-response effect by the amount of time spent doing the activity and the probability of engaging in ATOD use (Zill, Nord, & Loomis, 1995). Those students who engaged in 1-4 hours/week of activity were significantly less likely to smoke cigarettes or use drugs compared with peers engaged in no activity. The probability to use ATOD was even lower for adolescents who engaged in 5-19 hours/week of activity (Elder, Leaver-Dunn, Wang, Nagy, & Green, 2000). A sample of over 3,500 students from four high schools in Alabama also indicated a negative dose-response relationship between the number of extracurricular activities participated in and ATOD use (Elder et al., 2000); in other words, the higher the number of extracurricular activities in which an adolescent participated, the lower his/her ATOD use. Similarly, over 5,600 secondary school students were surveyed about extracurricular activity participation and ATOD use. Extracurricular activity participants had lower prevalence of ATOD use compared with non-participants (Cooley & Henriksen, 2001).

Sport Participation

According to data from the Youth Risk Behavior Survey, which collects data biannually from over 15,000 adolescents, approximately 63% are engaging in vigorous physical activity for at least 20 minutes per day, at least 3 days per week. There are differences by sex, ethnicity, and age reported in the *Table 3.* Participation declines from 9th grade (69%) to 12th grade (55%). Approximately 58% of students play on one or more sports teams either through school or through a community-based team. The demographic differences in formal sport participation are similar to those for physical activity. Approximately 55% of high school students are enrolled in a physical education class at school. Of these students, approximately 80% participated in more than 20 minutes of physical activity per class (Centers for Disease Control, 2000). In the state of Texas, high school students are required to take one and one-half credits of physical education in order to graduate. However, students may not exceed two credits of physical education among the total credits required to graduate (Texas Education Agency, 2004). *Table 2* contains national prevalence by race and sex for physical activity and sport for adolescents. Over half the students surveyed participate in one or more sports. Approximately 2/3 surveyed participate in some type of physical activity. The largest demographic of participants are white males.

Table 2: Physical Activity and Sport Participation Among Adolescents

9th-12th grade students	All	Male	Female	White	Black	Latino
Physical Activity Participants	63	70	55	65	55	59
Sport Participants	58	64	51	65	68	56
Physical Education Class	55	85	73	89	80	82

Listed as percentage (%) of representative sample (Centers for Disease Control, 2000)

Sport and ATOD Use: Positive Mathematical Relationship

Physical activity has been examined as a determinant of alcohol use in a slightly older cohort. Physical activity was associated with increased alcohol use and binge drinking in a sample of over 2,400 college students ages 18 to 23 (Dunn & Wang, 2003). Formal sport participation has been identified as a risk factor for ATOD use in adolescents (Zill et al., 1995). Researchers found mixed results for sport activities as protective factors for ATOD in a sample of over 3,200 middle and high school students in France. Volleyball, rugby, and wrestling were among the sports that were negatively associated with ATOD use. Football [soccer], dance, and gymnastics were positively associated with ATOD use (Challier et al., 1999). Moore and Werch found similar differences in ATOD use in a sample of approximately 900 8th graders in Florida when

physical activities were stratified. Surfers, skateboarders, and tennis players had significantly higher ATOD use than did rollerbladers. For school-sponsored sport participants, ATOD use was higher compared with non-sport participants (M. Moore & Werch, 2005). Similarly, data from the YRBS analyzed for South Carolina public school attendees in 1996 indicated the highest rates of binge drinking and smokeless tobacco use for "highly active athletes" (Rainey & McKeown, 1996). Smokeless tobacco use is consistently found to be highest among male sport participants (Rainey & McKeown, 1996).

Mixed results on health outcomes have been found for sport participants. A sample of over 400 high school students indicated sports participants engaged in more ATOD use than their peers. However, sport participants reported higher self-esteem and lower depression than did their non-sport participating peers (Gonzalez et al., 1994). Alcohol use among a sample of over 800 adolescents in France was higher among sport participants versus non-participants (Lorente et al., 2004).

Sport and ATOD: Negative Mathematical Relationship

Exercise, physical activity, and physical fitness have been shown to be negatively related to ATOD use (Masten, 1994; Oman et al., 2004). Data from the 1999 National YRBS survey was analyzed to determine relationships between physical activity and a variety of health-risk behaviors. Both physical

activity and formal, team-sport participation were associated with lower prevalence of ATOD use in a nationwide sample of over 15,000 high school students (Kulig et al., 2003). Participation in formal sport has been shown to be negatively related to maladaptive risk-taking behavior, in general (Gilligan, 1999).

Physical activity-level, regardless of sport status, is a negative predictor of ATOD use. A YRBS sample from South Carolina of nearly 8,000 high school students indicated a negative dose-response relationship between activity-level and smoking tobacco (Rainey & McKeown, 1996). Similarly, a study of over 1,300 Spanish adolescents indicated physical activity participation was associated with decreased ATOD use. Individuals who had tried drugs participated in the fewest number of physical activities compared with individuals who had not tried drugs (Aleixandre, Perello del Rio, & Palmer Pol, 2005).

The 2002 National Household Survey on Drug Abuse (NHSDA) indicated negative correlations between team sports participation and ATOD use among the sample of over 14 million 12-17 year olds. Sixty-one percent of the cohort were sports participants. The results were statistically significant, although the differences were not large (6% versus 10% for marijuana use, and 10% versus 12% for binge alcohol use for sport participants compared with non-participants, respectively). Smoking tobacco and approval of peers who smoke was lower among sport participants. (Smokeless tobacco was higher

among sport participants.) (Substance Abuse and Mental Health Services Administration, 2002).

Sport participation has been found to be negatively associated with risk factors for ATOD use. In two studies, sport participation was negatively predictive of depressed mood (Brown & Blanton, 2002; Kirkcaldy, Shephard, & Siefen, 2002). Similarly, a cross-sectionally designed study examined over 1,000 high school students and found a negative dose-response relationship for degree of involvement in sport and depressed mood for both males and females (Gore, Farrell, & Gordon, 2001).

In combination with other activities, sport participation was negatively related to ATOD use in a study of high school students. A 2003 study determined sport participation, when combined with other extracurricular activities, was negatively correlated with alcohol consumption and marijuana use (Harrison & Narayan, 2003). Research indicates differences by gender as well as differences by physical activity intensity for sport participation and ATOD use. A 1999 sample of over 10,000 French students showed sport participation was negatively related to ATOD use for males, but not for females, and was dependent on amount of time spent of participating. For the males engaging in very frequent or very infrequent physical activity, sport was negatively related to ATOD use (Peretti-Watel, Beck, & Legleye, 2002). Results from an ATOD use prevention program for rural adolescents indicated a negative relationship between sport participation and ATOD use, as well as a

negative relationship with scholastic achievement and ATOD use (Zavela, Battistich, Gosselink, & Dean, 2004).

There is additional evidence that the protective effect of sport on ATOD use is moderated by sex and race. A recent analysis of the National Educational Longitudinal Survey (NELS), a large 1988 U.S. Department of Education's National Statistics study of approximately 25,000 students over 4 years, indicates less cigarette and marijuana use among varsity athletes. However, when known predictors of ATOD use were partialed out of the analysis, sport participation was protective only for black females. Sport participation was a risk factor for marijuana for black and white males and for alcohol use for white females (Dawkins, Williams, & Guilbault, 2006). However, a study using similar methodology, data from the National YRBS, found black females, regardless of sport participation status, were the least likely individuals to use alcohol or tobacco (Rainey & McKeown, 1996).

Rationale for Examining Sport Participation as Beneficial

The mechanisms by which sport participation has been found to be protective or beneficial are not known. However, there are several probable mechanisms. Exercise has well-known effects on mood. Exercise reduces negative affect, both anxiety (Petruzello et al., 1991) and depression (Bartholomew et al., 2005; Blumenthal, 2000; Lox, Martin, & Petruzello,

2003). Exercise is the primary component of most sports. Negative affectivity is a risk factor for ATOD use in adolescents.

Certain sports are viewed by participants as being exciting or stimulating in which to engage. High sensation seekers do not participate in sports more often than do low sensation seekers. However, high sensation seekers participate in more "exciting" sports than do low sensation seekers (Franques et al., 2003; Jack & Ronan, 1998). Although sensation seeking is, in general a risk-factor for ATOD use, sensation seeking was examined in this study as a moderator by which sport participation might be protective against ATOD use among high sensation- seeking adolescents. The interaction of sensation seeking with sport participation could yield a different outcome on ATOD use than has been found in research examining the direct effect of sport participation. That is, sport participation might act as a socially acceptable channel through which sensation seeking flows.

Similarly, social competencies may be developed through sport participation. Either through modeling by peers or mentoring by the coach, sports may provide an adaptive forum in which prosocial skills develop (Carnegie Corporation of New York, 1992; S. S. Luthar & D'Avanzo, 1999). It is well-known that the mere proximity of a significant adult in an adolescent's life is a protective factor (Belenko & Logan, 2003; Stronski, Ireland, Michaud, Narring, & Resnick, 2000). Participation in sport provides an automatic opportunity of influencing adolescents via the coach. The relationship with the

supervising adult is most likely one of the key protective attributes of both sport and extracurricular activity participation (S. S. Luthar & D'Avanzo, 1999). In the worst-case scenario in which the adolescent does not develop a meaningful relationship with his coach, in the case of sports, the adolescent is being supervised outside school hours. Concurrently, the adolescent is engaged in activity and presumably free from boredom during sport participation. Boredom is a risk factor for ATOD use (Spooner, 1999).

Adolescents who feel a sense of accomplishment in performing well at an activity they value are less likely to be ATOD users (Gilligan, 1999; Sinclair & Gibbs, 1996; Siqueira & Diaz, 2004). Sports provide an opportunity to perform. By age 14-18, most individuals have a sense of the skills at which they excel. Therefore, it is reasonable to expect adolescents who are involved in formal sports at the high school level to possess skills in the sport(s) in which they participate.

Substance abusers, particularly users and abusers of stimulant-type drugs like cocaine and amphetamine, differ in brain chemistry as evidenced by magnetic resonance imaging (MRI) (National Institutes on Drug Abuse, 2007). Substance abusers differ in dopamine production and reuptake in the nucleus accumbens and reinforcement of the "pleasure-system pathway" to the prefrontal cortex. In other words, there is a physiological reward and a cognitive reinforcement to continue the behavior. Exercise stimulates dopamine production and promotes higher concentrations of dopamine in the

synaptic cleft than are present at rest (Cardinal, Winstanley, Robbins, & Everitt, 2004; R. Moore & Bloom, 1978; Zuckerman, 1994). Therefore, it is logical that sport participation, that includes physical exercise, could treat or possibly prevent substance abuse because the neurophysiological drive to seek dopamine would be attenuated, if not satiated, by exercise. This mechanism is particularly salient for individuals who have other protective factors against substance abuse, or who have had very grave consequences to substance use (e.g. imprisonment, loss of family and friends) who, for the latter, the incentive to stay clean, is very high.

Purpose

The purpose of this study was to elucidate the relationships between alcohol, tobacco, and other drug (ATOD) use, psychosocial determinants of ATOD use, and sport participation among adolescents. The direction of the relationship between sport participation and ATOD use is the primary question of interest: i.e., is sport participation a positive or negative influence on ATOD use? Additionally, the interaction between sensation seeking and ATOD use in relation to sport participation was examined: i.e., is sport participation a moderator in the relationship between sensation seeking and ATOD use? Lastly, in order to better understand the mechanisms by which sport affects ATOD use, the explanatory effects of psychosocial determinants of ATOD use were examined in the relationship between sport participation and ATOD use: i.e., do attitude, negative affect, social support, and subjective norms mediate the relationship between sport participation and ATOD use?

Hypotheses

1. ATOD use will be higher for individuals who do not participate in any extracurricular activities (including sport) than for individuals who participate in any extracurricular activity.

2. There will be a difference in ATOD use for sport participants versus non-sport extracurricular activity participants.

3. There will be a relationship between sport participation and alcohol and drug (ATOD) use. ATOD use will be higher for individuals who do not participate in sport than for individuals who participate in sport.

4. Sensation seeking will be lower for individuals who do not participate in sport than for individuals who participate in sport.

5. Sport participation will moderate the relationship between sensation seeking and ATOD use.

6. Negative affect will be higher for individuals who do not participate in sport than for individuals who participate in sport.

7. Attitudes, social support, subjective norms, and negative affect will mediate the relationship between sport participation and ATOD use.

Chapter III

Methods

This dissertation employed a variety of behavioral and psychometric, self-report measures to determine ATOD use, sport and extracurricular activity participation status, and psychosocial determinants of ATOD use in high school students. Parental consent for minors and consent for 18 year-olds were obtained prior to data collection. No identifying information was collected from any participant, thereby assuring participants' anonymity. This study used a non-experimental design. A cross-sectional sample was collected once during the fall scholastic semester by anonymous, online questionnaire.

Participants

Participants were students at three Central Texas-area high schools from one suburban school district. The researcher did not select study participants on the basis of ethnicity, sex, or socioeconomic status. Participants were ages 14-18, students in grades 9-12. Because all high school students in Texas public schools are required to take one semester of health class, and ATOD use is relevant to adolescent health, data were collected during health class. All students in health classes were asked to participate. Approximately 300 students were enrolled in health classes at three high schools during the semester in which data were collected. Total enrollment of three high schools was approximately 4,300 for 2003-4 academic year. Demographic data of city residents are presented in

Table 3. The average household income for study residents is approximately double that of the United States. Additionally, the percentage of owner-occupied homes is approximately double that of the U.S. Lastly, the secondary education-status of city residents is similar to the national average (US Census Bureau, 2006).

Table 3: Demographic Indicators of the School District and City

Race	Students
Black	22.1%
Latino	31.9%
White	37.5%
Asian-American	8.2%
Native-American	0.4%
Free/Reduced Lunch	42.1%
Limited English Proficiency	11.7%

Population	58,995
Average Household Income	$82,616
Median Household Income	$72,429
Owner-occupied homes	91.25%
Bachelor's Degree or higher	29.29%
School graduates attending college	57%

(Austin Title Company, 2006; Pflugerville Independent School District, 2004-5)

Pilot Study

A pilot study was conducted with adolescent participants recruited from a Central Texas community center. Ten out of 25 questionnaires were returned, seven of which had no missing data. Descriptive Statistics are presented in *Table 4*. Compared with previous research, the means and standard deviations were appropriate for each scale. Two changes were made to the final study based on the pilot study. Due to the low response rate (40%) from the 93 question, paper and pencil survey in the pilot study, the manner of data collection was changed from paper and pencil to online questionnaire for the final study. Additionally, the ATOD use questions were changed from a longer, adolescent ATOD use questionnaire in the pilot study, the Adolescent Alcohol and Drug Use Scale, (Moberg, 2003) to the Monitoring the Future Survey (MTF) (United States Department of Health and Human Services, 2003) for the final study. The Institutional Review Board approved the change in format and questionnaire. (See the *Table 5: Data Collection Instruments* section for detailed information on the survey questions).

Table 4: Descriptive Statistics from Pilot Study

Variable	n	mean	SD
Age	9	16.33	1.50
ATOD use	12	2.25	3.31
Attitude	11	6.36	3.30
Negative Affect	10	18.50	6.45
SES	8	4.13	3.27
Subjective Norms	9	14.89	7.54
Sensation Seeking	9	49.11	5.62

Procedure

Students were verbally recruited by their health class teacher during health class to participate in the study. All students in the state are required to take one semester of health class in four years of high school. Upon receipt of written parental consent and participant assent (or consent for 18 year-olds), participants were emailed a link to an online questionnaire. Both students who did and who did not have parental consent to participate in the study were present in the classroom for approximately five minutes of general instruction regarding the questionnaire. Only students who had parental consent or consented to participate in the study were taken to the computer lab by the health class teacher

to complete the study. Students who had parental consent and students who consented to participate were given approximately 20 minutes to complete the survey during health class. All students in the school district in which the study was conducted had access to the school library and have a school-issued email address. The questionnaire was written in English.

Data Collection Instruments

1. Alcohol, Tobacco, and Other Drug (ATOD) use

Alcohol, tobacco, and other drug (ATOD) use were assessed using questions from the Monitoring the Future (MTF) Survey, a large-scale epidemiological study conducted annually (United States Department of Health and Human Services, 2003). This method was selected so that data could be compared with national data and to assess the generalizability of the data. Other researchers have used this survey in adolescent research separate from the MTF Survey (S. S. Luthar & D'Avanzo, 1999). Questions inquire about alcohol, tobacco, and illicit drug use on a 4-point Likert-type scale of frequencies ranging from 0 = never to 3 = today. ATOD was treated as a continuous variable with a range from 0 to 39.

Cronbach's α is a measure of statistical reliability commonly used by social science researchers to indicate the internal consistency between items on a questionnaire (DeVellis, 2003; Pallant, 2005). $\alpha = 0.886$ for the sample in this

study. Values greater than 0.7 are considered desirable for α (Pallant, 2005). Therefore, internal consistency in assessing ATOD use in this study was reasonably reliable. The MTF publicly available data do not include reliabilities exclusive to the questions used in this study.

2. Sport Participation

Sport participation was assessed by asking participants to choose sports they play from a list provided that included a blank to fill in sports not listed. More general questions are asked of Monitoring the Future (MTF) Survey Participants, (United States Department of Health and Human Services, 2003) e.g., "Do you participate in sport?" Another study that included brief, general questions regarding sport participation was used in the National Educational Longitudinal Study (NELS) (Curtin, Ingles, Wu, & Heuer, 2002). The NELS data are publicly available to researchers and have been widely used in a variety of research on adolescents (Keith, 2006). The questions used for this study, the MTF questions, and the NELS questions regarding sport and extracurricular activity participation are extremely similar.

Because the primary interest of the study is the influence of sport on alcohol and drug use, and because many students participate in a fall semester sport and not in a spring semester sport, or vice versa, a question was included to determine whether the student is currently "in season" for his/her primary sport. The continuous score for sport participation was derived from a product of

[(number of activities x time spent engaging in activity) + in-season status (1-point for affirmative)]. If the participant answered "no" to the question, "Do you play a sport that is currently not in-season?" the sport participation score was calculated using only (number of activities x time spent engaging in activity). The sport participation score was treated as a continuous variable for the multiple regression analyses (hypotheses 4-5) and the path analysis (hypothesis 7), and as a categorical variable, (Category Label = 2) indicating activity group-membership for the mean comparisons (hypotheses 1-3, and 6). (See the *Statistical Analyses* in **Chapter IV: Results** for further discussion).

3. Extracurricular Activity Participation

Extracurricular activity participation was assessed by asking participants to choose from a list of activities that included a blank to fill in activities not listed**.** When possible, qualitative responses were recoded to quantitative values. For example, if a response was not indicated for academic club participation, however, "Latin Club" was written in the blank for activities not listed, this response was considered "affirmative" for academic club participant. As were the sport questions, very similar questions were asked of adolescent participants by the NELS regarding extracurricular activity participation (Curtin et al., 2002). Extracurricular activity participation was treated as a categorical variable, (Category Label = 1) indicating activity group-membership for the mean

comparisons (hypotheses 1-3, and 6). (See the *Statistical Analyses* in **Chapter IV: Results** for further discussion).

4. Attitude

Attitude towards ATODs was assessed using indirect measures of behavioral beliefs about ATODs and evaluations about ATODs (Ajzen, 1991). Similar questions and scoring have been used to collect data for attitudes regarding ATOD use among adolescents and adults (Botvin & Kantor, 2000; Marcoux & Shope, 1997; Morrison, Spencer, & Gillmore, 1998; vonHaeften, Kenski, Kasprysk, & Montaño, 2001). Two questions inquire about what the participant believes will happen if he/she uses alcohol and/or drugs. Two questions inquire about the importance/value the participant places upon using alcohol and/or drugs. Each question used a 5-point, Likert-type scale anchored by 1 = disagree completely and 5 = agree completely. A net score of the sum of the items was used in the analysis where a high score indicates a favorable attitude towards ATOD use. Although Likert-type scale scores are, in fact, ordinal, it is common practice among social science research to treat Likert-type scale scores as continuous variables when there are at least 5 categories. This practice has been shown to have little effect on type I or type II error rates (Jaccard & Choi, 1996). Internal consistency was favorable for this study data (Cronbach's α = 0.8262).

5. Sensation Seeking

Sensation seeking was assessed using the Arnett Sensation Seeking Scale (AISS). This scale has previously been used to assess sensation seeking in adolescents (Arnett, 1994). The AISS is a more parsimonious alternative to Zuckerman's 40-item, forced-choice Sensation Seeking Scale (SSS), (Zuckerman, 1994). The AISS assesses intensity seeking and novelty seeking as the primary dimensions of sensation seeking. The emphases of the AISS are on the importance of the influence of socialization (not simply biology) on sensation seeking and sensation seeking as a global personality trait. The AISS does not, however, contain any items on risk-taking behavior. The AISS contains 20 items and uses a 4-point, Likert-type scale anchored by 1 = does not describe me at all and 4 = describes me very well. Arnett assessed reliability of the scale in a study that compared two samples of adolescents by correlating scores on the AISS with a variety of risk-taking behaviors and scores on Zuckerman's SSS. Internal consistencies ranged from 0.83 to 0.86 on the subscales for each sample. Correlations between the AISS score and risk-taking behaviors were higher than the correlations of Zuckerman's SSS with risk-taking behaviors (Arnett, 1994).

Reliability for the sample in this study was low (Cronbach's $\alpha = 0.56$). By employing the "α if item deleted" output from SPSS, the questionnaire items were initially iteratively removed in order to achieve the highest possible α as suggested by Devillis (DeVellis, 2003). However, removing items did not

increase α to a desirable value ($\alpha = 0.59$); therefore all the items from the AISS were retained for the analyses.

6. Social Support

The social support provided by the coach and/or supervising adult for sport and/or extracurricular activities respectively was assessed using eight questions of the emotional and informational support subscale from the Social Support Survey (SSS) (Sherbourne & Stewart, 1991). Factor loadings on emotional and informational support for the questions ranged from 0.82 to 0.89. An additional question inquired about the source of the support, i.e. family, coach, clergy, and/or other. The survey questions gather frequency of availability of specific scenarios of support. The SSS uses a 5-point, Likert-type scale and is anchored by 0 = None of the time and 5 = All of the time. Similar scales have been used to assess perceived social support by adolescents (Bowen & Chapman, 1996; L. Rosenfeld & Richman, 2000; L. R. Rosenfeld et al., 1998). Cronbach's α for this sample was high ($\alpha = 0.953$).

7. Subjective Norms

Subjective norms regarding ATOD use were assessed as a direct measure using a 5-point Likert-type scale for questions inquiring about the beliefs the participant has regarding the beliefs of his/her peers within his activity group. Similar questions and scoring have been used to collect data for subjective norms

regarding ATOD use among adolescents and adults (Conner et al., 1999; Marcoux & Shope, 1997; Morrison et al., 1998; O'Callaghan, Chant, Callan, & Baglioni, 1997; vonHaeften et al., 2001). Three items are favorable, and three items are unfavorable. Responses were anchored by 1 = Completely Disagree and 5 = Completely Agree. Items indicating favorable norms for ATOD use were given a score of five (highest possible score); unfavorable items were reverse scored so that a high total score indicates a subjective norm favorable for ATOD use (Ajzen, 1991). The scores for all were summed into a composite score. The rationale for treating the subjective norm score as a continuous variable is the same as was used for the attitude score.

8. Negative Affect

The PANAS is a 20-item questionnaire with positive (interested, excited, alert, etc.) and negative (guilty, nervous, upset, etc.) affect subscales. It is scored on a 5-point, Likert-type scale anchored by 1 = very slightly or not at all and 5 = extremely. The subscales, positive affect (PA) and negative affect (NA), are calculated by summing the 10 items for each valence that range from 10-50 in each scale. This study only used the NA items in the analysis; however, the PA items were retained. The inclusion of both items was intended to increase validity among the responses by encouraging the participant to read each question. In other words, if a respondent indicated 5 = extremely on both the positive and negative items, his/her responses would not be considered a valid indication of

his/her affect.

The subscales of the PANAS have shown acceptable internal consistencies (Cronbach's α ranging from 0.84 to 0.87 for NA) and external validities (Watson, Clark, & Tellegen, 1988). The PANAS is regularly used with studies regarding exercise and has shown acceptable validity (Bartholomew & Miller, 2002). Because the interest of this study is to determine predictors of behavioral patterns, questions will be phrased in terms of "how you feel in general" to gather affective trait information. The 10 negative items from the original PANAS are : 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. These are not numbered as such on the questionnaire, however do appear in this numerical order. The reliability for the data in this study was very similar to that found by Watson et al., ($\alpha = 0.847$) the developers of the PANAS.

9. Demographic Variables

Demographic variables, ethnicity, race, sex, grade level, and age were assessed using single item, self-report responses. Participants were given the option "decline to answer" on these items. Questions regarding ethnicity and race are directed by the National Institutes of Health Guidelines for Research (National Institutes of Health, 2002).

10. Socioeconomic Status (SES)

Socioeconomic Status was measured using a self-rating of a graphical representation. Children and adolescents often do not know by dollar amount how much their parents earn, the cost of living, or monetary savings their family has. Therefore, the graphical representation of a ladder was used to assess their own family's status relative to the status of their cohort. Previous researchers have used this method to collect SES data from adolescents. In the initial study of this metric, 10,000 adolescents self-evaluated SES on this ladder, and their responses were cross-validated with other markers of SES (paternal education and income). The intraclass correlation for the self-rated ladder was 0.79, indicating high reliability (E. Goodman et al., 2001). For this study, participants were asked to rate themselves on the ladder in terms of community standing by choosing a rung of the ladder that best represents their standing. As suggested by previous researchers, responses were tallied using a 10-point scale (MacArthur Research Network, 2002).

Table 5: Dependent and Independent Variables

Primary Dependent Variable

Variable	Scale for Analysis	Questionnaire
Alcohol, Tobacco, and Other Drug Use	Continuous score ranging from 0 to 39	ATOD Questions from Monitoring the Future (United States Department of Health and Human Services, 2003)

Independent Variables

Variable	Scale for Analysis	Questionnaire
Sport Participation Status	Continuous score [(number of sports x hours) + in-season status)], Categorical value = 2	Activity list, hours of participation, single question for season
Extracurricular Activity Participation Status	Categorical value = 1	Activity list
Activity Participation Status	Categorical value: 0 = no activity 1 = extracurricular only 2 = sport only 3 = both activities	Activity list

Table 5 (continued):

Variable	Scale for Analysis	Questionnaire
In-season or Off-season Sport Participation	Dichotomous category 0/1 added to Sport Status	Single question
Negative Affect*	Continuous score on negative items of PANAS ranging from 10 to 50	PANAS (Watson et al., 1988)
Attitude	Continuous Score ranging from 4 to 20	Indirect measure of attitude (Ajzen, 1991)
Ethnicity and Race	Categorical responses on Race coded 0 to 5 and Ethnicity	(NIH, 2002)
Grade Level	Categorical Grade Level Response ranging from 9 to 12	Single question
Sensation Seeking*	Continuous Score on AISS ranging from 20 to 80	Arnett Sensation Seeking Scale (AISS) (Arnett, 1994)
Sex	Categorical response	Single question
Social Support	Continuous Score on SSS ranging from 0 to 32	Social Support Scale (Sherbourne & Stewart, 1991)
Socioeconomic Status	Continuous Score ranging from 1 to 10	SES ladder (MacArthur Research Network, 2002)
Subjective Norms	Continuous Score ranging from 6 to 30	Direct measure of SN (Ajzen, 1991)

* also examined as DVs

Power Analysis

Prior to data collection, a power analysis was conducted using a power table as suggested by Cohen (Cohen, 1992) for four groups (No activity, extracurricular activity, sport, and both activities) of 30 participants per group, and a small effect size ($d = 0.2$). Power was calculated to be ample to detect an effect if an effect were present ($\omega^2 = .99$). High statistical power such as this decreases type II error (Stevens, 2004; Keith, 2006).

Data Analyses

Mean comparisons such as those called for by Hypotheses 1-4 and 6 were calculated using analysis of variance (ANOVA). For each comparison, two groups were examined for the comparisons. For example, comparison of sport participants with non-participants was analyzed by a mean comparison on the dependent variable for study participants who participated in sports with the mean on the dependent variable for study participants who did not participate in sports. The latter included study participants who did not participate in any activity and those who only participated in non-sport extracurricular activities. **Chapter IV Results** contains each hypothesis and each analysis performed preceding each hypothesis test result.

Chapter IV

Results

Participant Characteristics

The participants were delimited to high school students ages 14-18 from three Central Texas-area public schools. Each participant attended one of three schools, making each sample somewhat homogenous. Students in health classes from three high schools were asked to participate in the study. Because approximately 300 students were enrolled in health classes in the three high schools sampled, 300 parental consent and self-consent forms were distributed to the students. Two hundred thirty-nine (approximately 79%) students participated in the study. One hundred and ninety (approximately 63%) answered all 87 questions. *Table 6* contains detailed demographic information. The sample population was heterogeneous on ethnicity and race and was comprised of approximately half males and half females. The students rated themselves as just below five on a 1-10 scale for SES. However, as presented in *Table 4*, the median income of the city is approximately double the national median. Lastly, the participants' mean age was younger than is the age for which the prevalence of ATOD use is greatest (See *Table 1*).

Table 6: Demographics of Study Participants

Demographic Variable	n	median	SD	Range
Age in years	195	16	1.26	14-18
Grade	193	10th	1.34	9-12

Demographic Variable	n	Percent of Respondents	Range	Percent in District
Ethnicity	203		1-2	
Hispanic	52	25.5		31.9
Non-Hispanic	129	63.2		68.1
Race	116		1-6	
Native Amer. /Alas.	11	5.4		0.4
Asian	17	8.3		8.2
Native Haw. /Pac. Isle.	36	17.6		*
Black/Af.Amer.	43	21.1		22.1
White/Caucasian	109	53.4		37.5
Sex	204		1-2	*
Female	104	51		
Male	99	48.5		
SES	204	M = 4.71 SD = 2.13	1-10	*

* Data not available

Preliminary Statistical Analyses

Descriptive Statistics

SPSS Software was used to calculate descriptive statistics, to examine the data in reference to the assumptions of analysis of variance, and for analyses relevant to hypotheses 1-6 ("SPSS," 2002). Calculation of statistical significance for all the analyses was tested using $\alpha = 0.05$. Pairwise deletion was used for the bivariate correlations in the case of missing data. Listwise deletion was used in the case of missing data in the remaining analyses. Four groups were specified for the analyses based on activity. *Table 7* contains the activity category labels. Descriptive and Demographic statistics are presented in *Tables 8 and 9*, respectively, and the correlation matrix is presented in *Table 11*.

Table 7: Category Classification Labels

Category Number	Label	Description
0	**NO**	No activity
1	**EC**	Extracurricular activity only
2	**SP**	Sport only
3	**AL**	Both Sport and Extracurricular Activity

Table 8a: Descriptive Statistics for Dependent and Independent Variables

Variable	n	mean	SD	Range
ATOD Use	213	2.52*‡	4.11	0-36
Attitude	209	5.96	3.06	4-18
Negative Affect	210	20.18	6.90	10-40
Sensation Seeking	204	46.50	6.64	29-66
Social Support	203	32.65	7.68	8-40
Sport (Continuous)	209	7.45	6.86	0-31
Subjective Norms	208	14.69	6.45	6-30

*Used alcohol in past 30 days
‡Past 30 days ATOD Use for this sample was 18% compared to 18.6%, 35.2%, 48% of 8th, 10th, and 12th graders, respectively from a 2004 National data set (Health Chartbook, 2005)

Table 8b: Descriptive Statistics by Activity Category

Variable	n	Item Response Percent
Sport Participants ≥ 1 sport (yes/no)	112	*53.6
School – Team	61	54.5
School – Individual	41	36.6
Club – Team	26	23.2
Club – Individual	14	12.5
Extreme Sports	14	12
Not in Season	105	50.2
Extracurricular Activity Participants (yes/no)	119	56.9
Academic Club	26	26.9
Arts	71	59.6
Religious Organization	48	40.3
Volunteer	36	30.3
Work	3	2.3

*Compared to 58 % of 9-12th graders in 2004 engaged in regular physical activity (Health Chartbook, 2005)

Table 9: Demographic Statistics by Activity Category

	NO	EC	SP	AL
n	52	49	42	70
Hispanic	14	13	12	12
Non-Hispanic	26	32	24	47
White	21	26	22	40
Black	7	10	8	11
Female	24	30	14	36
Male	22	17	26	33
SES > 5	17	13	11	22
SES ≤ 5	22	33	27	45

It is anecdotally known that most current sport participants (SP) play some sport year-around. Therefore, in order to quantify these participants, SP who answered yes to the question inquiring about in-season status were parceled-out and identified by study variable means in *Table 10*. Of sport participants, (n = 209) over half (n = 105) also played a sport that was not currently in season. While statistical mean comparisons were not calculated, it appears the study variable means were similar for SP and SP who also play a sport that was not in season. *Table 14* contains the complete study variable means by activity category.

Table 10: Variable Means for SP, "Not in Season"

Sport Participants who also play a sport "not in season"	**Yes** 105	**No** 86
ATOD Use (log. transf.)	.3617*	
	.523 ‡	
Attitude	2.77	
	2.451	
Negative Affect	6.660	
	10.62	
Sensation Seeking	45.31	
	6.66	
Social Support	26.86	
	6.82	
Subjective Norms	9.50	
	6.292	

* = mean, ‡ = standard deviation for each

Table 11: Pairwise Bivariate Correlations between Dependent and Independent Variables

	ATOD Use	Attitude	Negative Affect	Subjective Norms	Social Support	Sensation Seeking
ATOD Use	1					
Attitude	.626**	1				
Negative Affect	.051	-.005	1			
Subjective Norms	.350**	.414**	.009	1		
Social support	.035	-.073	.177*	-.001	1	
Sensation Seeking	.208**	.173*	.029	-.146*	.001	1

* $p < 05$. ** $p < .01$.

The bivariate, Pearson correlations indicated the study variables were related in the expected direction; the exception was sensation seeking. It is well known that sensation seeking and ATOD use have a positive relationship. That is, as sensation seeking increases, ATOD use increases. Because this correlation was not in the expected direction, because mean sensation seeking was lower than expected for this age-range, and because the reliability of sensation seeking for this sample was low ($\alpha = 0.59$), correlation matrices were examined in more detail by activity group. *Table 12* contains correlation matrices for the study variables grouped by activity category.

Table 12a: Pairwise Bivariate Correlations for NO

	ATOD Use	Attitude	Negative Affect	Subjective Norms	Social Support	Sensation Seeking
ATOD Use	1					
Attitude	.660**	1				
Negative Affect	-.197	.014	1			
Subjective Norms	.449**	.409**	-.159	1		
Social Support	-.095	-.076	-.207	.079	1	
Sensation Seeking	-.331	-.260	-.005	-.242	.141	1

* p < 05. ** p < .01.

Table 12b: Pairwise Bivariate Correlations for EC

	ATOD Use	Attitude	Negative Affect	Subjective Norms	Social Support	Sensation Seeking
ATOD Use	1					
Attitude	.599**	1				
Negative Affect	.044	.017	1			
Subjective Norms	.232	.301*	.022	1		
Social Support	-.014	-.161	-.166	.045	1	
Sensation Seeking	-.400*	-.247	-.121	.094	.110	1

- $p < 05$. ** $p < .01$.

Table 12c: Pairwise Bivariate Correlations for SP

	ATOD Use	Attitude	Negative Affect	Subjective Norms	Social Support	Sensation Seeking
ATOD Use	1					
Attitude	.505**	1				
Negative Affect	-.114	-.159	1			
Subjective Norms	.412*	.552**	-.005	1		
Social Support	.000	-.028	-.197	.021	1	
Sensation Seeking	-.258	-.241	.093	-.369*	.049	1

* $p < 05$. ** $p < .01$.

Table 12d: Pairwise Bivariate Correlations for AL

	ATOD Use	Attitude	Negative Affect	Subjective Norms	Social Support	Sensation Seeking
ATOD Use	1					
Attitude	.666**	1				
Negative Affect	-.099	.085	1			
Subjective Norms	.458**	.410**	.154	1		
Social Support	-.048	-.037	-.144	-.065	1	
Sensation Seeking	-.219	-.097	.130	-.268*	.033	1

* p < 05. ** p < .01.

As illustrated in *Table 12, t*he unexpected, negative relationship between ATOD use and sensation seeking persisted across activity groups. Considering the low reliability for sensation seeking in this sample, the unusual relationship suggests the anomaly was caused by a measurement error in sensation seeking. However, this inference is not indisputable. Regardless, findings in the hypothesis tests that require the metric for sensation seeking should be interpreted with caution.

Frequency Distributions

All measured variables were normally distributed, which is in concordance with the assumptions for analysis of variance (ANOVA), except ATOD use. Skewness and kurtosis of ATOD use were high and positive (4.570 and 31.696, respectively). Skewness > 2 and Kurtosis > 7 indicate non-normally distributed scores. Additionally, skewness was greater than three standard errors of skewness (SE = 0.167), another indication of a non-normal frequency distribution. In order to attenuate the deleterious effect of the non-normal distribution, a logarithmic transformation of each score on ATOD use was computed and used for the analyses as suggested by Tabachnick and Fidell (Tabachnick & Fidell, 2007).

An additional assumption required by employing ANOVA, which was confirmed in the preliminary analyses, is the homogeneity of error variances of the independent variables with the dependent variable. The homogeneity of the error variances for attitude, negative affect, sensation seeking, social support, and subjective norms were confirmed by non-statistically significant Levene's Statistics $F(1, 201) \leq 2.519$ (Critical F = 7.88). In other words, the error variances of the independent variables were not systematically related to ATOD use, meeting the assumption of homoscedasticity for ANOVA.

Preliminary Relationships among Variables

A univariate, multiple regression analysis (Omnibus F-test) supported the basis of the study that there is a relationship among the variables. The overall F statistic was statistically significant when examining the dependent variable (ATOD use) with all the predictor variables (Attitude, Negative Affect, Subjective Norms, Social Support, and Sensation Seeking) simultaneously. Ordinary least squares criteria were used to estimate standardized regression parameters. Information from the regression is presented in *Table 13*.

Table 13a: ANOVA Source Table for Omnibus F-test

Source	SS	df	MS	F	R^2
Regression	7.204	5	1.441	17.706*	.400
Residual	10.822	133	.081		
Total	18.026	138			

Predictor Variables: Attitude, Negative Affect, Social Support, Sensation Seeking, and Subjective Norms.
Dependent Variable: ATOD use
*p < .01.

Table 13b: Coefficients

Predictor	B	Std. Error	β	t	p
Attitude	.615	.227	.491	2.713	.008
Sport (Continuous)	.051	.008	-.159	-2.267	.000
Negative Affect	-.009	.004	-.053	-.770	.025
Sensation Seeking	-.003	.004	-.115	-2.206	.443
Social Support	.000	.003	-.007	-.007	.923
Subjective Norms	.009	.005	.148	.148	.060

Dependent Variable: ATOD use
*p , .05, **p < .01.

The four groups initially specified for the hypothesis analyses were classified by extracurricular activity-status. These activity-category groups were combined or individually compared, as called for by each hypothesis test. The grouped comparisons are explained in detail under each hypothesis. *Table 14* contains means and standard deviations on each variable by group. The means for each variable fall within the ranges observed in previous research. However, the mean for sensation seeking was low compared with adolescents in other research. Mean sensation seeking on the AISS was 54.52 in a sample of 139 adolescents whose mean age was 17 (Arnett, 1994).

Table 14: Activity Category Group Means

	NO	EC	SP	AL
n	39	46	38	66
ATOD Use (log. transf.)	.5211*	.4357	.316	.3496
	.386 ‡	.363	.322	.354
Attitude	5.90	5.37	6.37	5.92
	3.62	2.32	2.86	2.94
Negative Affect	20.90	22.70	19.16	19.38
	7.326	7.235	6.433	6.440
Sensation Seeking	46.54	45.24	46.50	45.35
	5.23	5.42	5.874	5.58
Social Support	30.54	32.61	33.53	33.18
	9.48	6.79	6.83	7.35
Subjective Norms	16.59	13.67	15.08	13.95
	6.52	6.54	6.52	5.98

* = mean, ‡ = standard deviation for each

Hypotheses Tests

The following section contains results for all the hypothesis tests (1-7). For each hypothesis test, the research question to which the hypothesis refers, the null hypothesis, the source table and relevant statistical data, and the results are listed and described.

Hypothesis 1: ATOD use will be higher for individuals who do not participate in any extracurricular activities (including sport) than for individuals who participate in any extracurricular activity.

H_0: $\mu_{NO} = \mu_{AL}$

A one-way analysis of variance (ANOVA) was used to compare two group means for ATOD use ($mean_{NO} = 0.521$, $SD_{NO} = 0.386$, and $mean_{AL} = 0.362$, $SD_{AL} = .347$).

The H_0 was rejected that there is no difference in ATOD use when comparing AL with NO. There is a statistically significant difference in ATOD use when comparing students who participate in no extracurricular activities with students who participate in any extracurricular activity. ATOD use is higher for students who do not participate in any activities, which is congruous with the basis for the study and addresses Research Question 1. *Table 15* contains source information.

Table 15: ANOVA for Hypothesis 1

Source	SS	df	MS	F	*d*
Between Groups	.643	1	.643	5.060*	.443
Within Groups	18.037	142	.127		
Total	18.679	143			

*$p < .05$

Hypothesis 2: There will be a difference in ATOD use for sport participants versus non-sport extracurricular activity participants.

H_0: $\mu_{SP} = \mu_{EC}$

ANOVA was used to compare two group means for ATOD use ($mean_{EC}$ = 0.435, SD_{EC} = 0.363, and $mean_{SP}$ = 0.3164, SD_{SP} = .323). Failed to reject the H_0. ATOD use does not significantly differ when comparing SP with EC. Although ATOD use was higher for EC than for SP, the difference was not statistically significant. These findings do not support the basis of the study, however do provide information relevant to Research Question 1b. *Table 16* contains source information.

Table 16: ANOVA for Hypothesis 2

Source	SS	df	MS	F	*d*
Between Groups	.226	1	.226	1.935*	.344
Within Groups	7.369	63	.117		
Total	7.595	64			

* p = 0.169

Hypothesis 3: There will be a relationship between sport participation and ATOD use. ATOD use will be higher for individuals who do not participate in sport than for individuals who participate in sport.

H_0: $ß_{NO} = ß_{SP}$

A regression analysis was used to examine the relationship between sport participation and ATOD use. The H_0 could not be rejected. There was not a statistically significant effect of sport on ATOD use for this sample. The standardized β (β = - 0.118) was, however, in the expected direction with respect to Research Question 1. That is, a negative relationship between sport and ATOD use was observed: as degree of sport participation increases, ATOD use would decrease. However, again, the effect was not statistically significant. *Table 17* contains source information from the regression analysis.

Table 17a: Regression for Hypothesis 3

Source	SS	df	MS	F
Regression	.256	1	.256	1.976*
Residual	18.162	140	.130	
Total	18.418	141		

Dependent Variable: ATOD use
*p = 0.162

Table 17b: Coefficients

Predictor	B	Std. Error	β	t	p
Sport (Continuous)	-.006	.004	-.118	-1.406	.162

Hypothesis 4: Sensation seeking will be lower for individuals who do not participate in

sport than for individuals who participate in sport.

H_0: $\mu_{SP} = \mu_{NO}$

ANOVA was used to compare mean sensation seeking for SP and NO. ($mean_{SP}$ = 46.00, SD_{SP} 6.75, and $mean_{NO}$ = 47.38, SD_{NO} = 6.75). Failed to reject H_0. There is not a statistically significant difference in sensation seeking when

comparing SP with NO. Information from this hypothesis begins to address research question 2, however, does not support the basis for examining sensation seeking as a moderator. Based on information from **Chapter II Review of Literature,** sensation seeking was expected to be higher for sport participants than for non-participants. *Table 18* contains source information.

Table 18: ANOVA for Hypothesis 4

Source	SS	df	MS	F	*d*
Between Groups	53.668	1	53.668	1.178*	.204
Within Groups	6012.213	132	45.547		
Total	6065.881	133			

*p = 0.280

<u>Hypothesis 5:</u> Sport participation will moderate the relationship between sensation seeking and ATOD use.

H_0: $R^2_{\text{Full Model}} = R^2_{\text{Restricted Model}}$ *

*Full Model: ATOD use = Sensation Seeking + Sport + Sensation Seeking*Sport

Restricted Model: ATOD use = Sensation Seeking + Sport

Multiple regression was used comparing a full and restricted model to examine ΔR^2. All variables were mean-centered as suggested by Keith (Keith, 2006). Rejected the H_0. SP moderates the relationship between sensation

seeking and ATOD use. The full model F(2, 139) = 7.676 (Critical F = 6.91) was statistically significant. The restricted model F(3,139) = 5.161 (Critical F = 5.42) was also statistically significant. Lastly, the ΔR^2 ($\Delta R^2 = 0.031$) was also statistically significant. In other words, the addition of the interaction term in the full model better accounted for the variance in ATOD use than did the restricted model. The inclusion of both degree of sport participation and sensation seeking significantly predicted ATOD use, and moderation was present. Findings from this hypothesis answer Research Question 2. *Table 19* contains the model comparisons.

Table 19a: Full and Restricted Model Comparisons

Model	SS	df	MS	F	R^2	ΔR2
Regression Restricted Model	1.136	1	1.136	9.954*	.067	.067**
Residual	15.747	138	.114			
Total	18.863	139				
Regression Full Model	1.856	2	.826	7.429*	.098	.031*
Residual	16.301	137	.111			
Total	18.157	139				

*p , .05, **p < .01

Table 19b: Coefficients

Model	Predictor	B	Std. Error	β	t	p
Restricted	Sensation Seeking	-.014	.004	-.259	-3.155	.002
Full	Sensation Seeking	-.014	.004	-.272	-3.343	.001
	Sensation Seeking x Sport	.000	.000	-.175	-2.154	.003

<u>Hypothesis 6:</u> Negative affect will be higher for individuals who do not participate in sport than for individuals who participate in sport.

H_0: $\mu_{SP} = \mu_{NO/EC}$

EC and NO were grouped for the comparison of the two means; i.e. mean negative affect of those who do not participate in sport (NO and EC) was compared with mean negative affect of sport participants (SP). ANOVA was used for the comparison ($mean_{SP} = 10.07$, SD_{SP} 6.38, and $mean_{NO/EC} = 12.20$, $SD_{NO/EC} = 7.42$). Failed to reject H_0 that Negative Affect significantly differs when comparing SP versus NO/EC for this sample. As expected, SP had lower negative affect than did NO/EC, but the difference was not statistically significant. This hypothesis was tested to provide insight for Research Question 1, as a mechanism by which sport participation might be protective, and for

Research Question 3, which simultaneously examines possible protective (mediating) factors in the relationship between sport participation and ATOD use. *Table 20* contains source information.

Table 20: ANOVA for Hypothesis 6

Source	SS	df	MS	F	*d*
Between Groups	133.72	1	133.712	2.63*	.310
Within Groups	7010.704	138	50.80		
Total	7144.421	139			

*p = 0.107

Hypothesis 7:

Path analysis was used to simultaneously test for mediators for hypothesis 7 using AMOS Software (Arbuckle, 2006). For the path analysis, maximum likelihood estimation was used. Bootstrapping was used to provide indication of statistical significance of the estimates of potential mediators by empirically calculating their sampling distributions (Preacher, Rucker, & Hayes, in press). In the initial model, the error variances of all the predictor variables were allowed to covary (Preacher & Hayes, in press). Non-significant covariances were iteratively removed from the model in order to improve model fit (Byrne, 1994). The most parsimonious model was retained. Based upon information gained from the preliminary analyses of the path model, underlying theory, and logical

relationships among the variables, error variances for Attitude with Subjective Norms (Ajzen, 1991), and Negative Affect with Social Support (Newcomb & Bentler, 1988), were allowed to covary. *Table 21* contains the correlations and covariances between the error variances. *Table 22* contains the variance/covariance matrix. The variance/covariance matrix, calculated using pairwise deletion for missing values, was the input data for the path analysis. Inputting this matrix is common practice for path analysis (Keith, 2006).

Table 21: Covariances and Correlations

	Error Variance	**Covariance**	**Critical Ratio**	**Correlation**
Negative Affect ↔ Social Support		-8.110*	-2.250	-.158
Attitude ↔ Subjective Norms		8.144**	5.451	.415

*p < .05, **p < .001.

Table 22: Variance/Covariance Input Matrix for Path Analysis for Hypothesis 7

		Attitude	Negative Affect	Social Support	Sport	Subjective Norms	ATOD Use
n		209	210	203	209	208	144
mean		2.960	11.180	25.650	7.450	9.690	0.399
stdev		3.064	6.904	7.679	6.860	6.451	0.361
cov	**Attitude**	9.388					
cov	**Negative Affect**	-0.101	47.667				
cov	**Social Support**	-1.740	-9.384	58.961			
cov	**Sport**	-0.221	-8.477	6.855	47.056		
cov	**Subjective Norms**	8.197	0.405	-0.043	-2.885	41.615	
cov	**ATOD Use**	0.697	-0.130	-0.109	-0.269	0.881	0.131

Note: Variances are on the diagonal. Covariances are on the off-diagonal.

Hypothesis 7: Attitudes, social support, subjective norms, and negative affect will mediate the relationship between sport participation and ATOD use.

$$H_0: \varepsilon^2_{\text{Attitude}} = \varepsilon^2_{\text{Negative Affect}} = \varepsilon^2_{\text{Subjective Norm}} = \varepsilon^2_{\text{Sensation Seeking}} = \varepsilon^2_{\text{Social Support}} = \varepsilon^2_{\text{Sport}} = 0$$

Failed to reject the H_0. The path analysis only indicated one, very small, but statistically significant indirect effect in the model. There was an indirect effect of degree of sport participation (SP) on ATOD use ($\beta = -0.002$). Because this does not indicate a practical measure of significance, the H_0 cannot be rejected.

However, there were statistically significant effects of practical interest to the study in general and to Research Question 1. There were statistically significant direct effects for sport participation on social support and on negative affect. SP negatively predicted negative affect ($\beta = -0.18$) and predicted social support ($\beta = 0.13$). SP had no effect on attitude, but attitude had a large, positive effect on ATOD use ($\beta = 0.57$). Similarly, subjective norms had a positive effect on ATOD use ($\beta = 0.13$). The most notable finding is that SP negatively predicted ATOD use ($\beta = -0.11$).

The results from the path analysis are congruous with the results for Hypotheses 1, 2, and 4, although only results for Hypothesis 1 were statistically significant. For this sample, the relationship between sport participation and

ATOD use is negative; i.e. sport is protective against ATOD use among these adolescents.

Also of interest for path model interpretation are the coefficients of multiple determination (R^2) as representing of the portion of variance explained by each variable in the model. $R^2 = 0.425$ for ATOD use. The majority of the variance in ATOD use explained in the model is due to the strong, positive relationship between Attitude and ATOD use ($\beta = 0.58$, $R^2 = 0.33$). *Table 23* contains a complete list of effects.

Table 23: Direct, Indirect, and Total Effects from Path Analysis

Relationship	Direct Effect	Indirect Effect	Total Effects	Unst. Total Effects	Critical Ratio
Sport→Attitude	-.011	.000	-.001	-.005	-.152
Sport→ Negative Affect	-.179	.000	-.166**	-.180	-2.630
Sport→ Subjective Norms	-.065	.000	-.029	-.061	-.945
Sport→Social Support	.130	.000	.117*	.146	1.898
Attitude→ATOD Use	.572	.000	.587**	.068	9.919
NegativeAffect→ ATOD Use	-.069	.000	.065	-.004	-1.273
SubjectiveNorms→ ATOD Use	.134	.000	.102*	.065	1.719
SocialSupport→ ATOD Use	.005	.000	.096	.000	.091
Sport→ATOD Use	-.107	.002	-.034*	-.006	-1.984

*p < .05.
**p < .01.

The path model fit, χ^2 (4, n = 210) = 1.574, p = 0.813 was not statistically significant, a desirable outcome for path analysis. Root Mean Square Error of Approximation (RMSEA) is designed to approximate the fit of the model. RMSEA < .05 is considered a good fit. RMSEA= .000. The comparative fit index (CFI) assesses the fit of the model relative to the independence (null)

model. CFI > .90 is desirable. CFI = 1.000. Similar to the CFI, the Tucker-Lewis index (TLI), a non-normed fit index corrects for model complexity. TLI = 1.057. Values closest to one are desirable for TLI; however a value greater than one is not invalid (Keith, 2006; Kline, 2005).

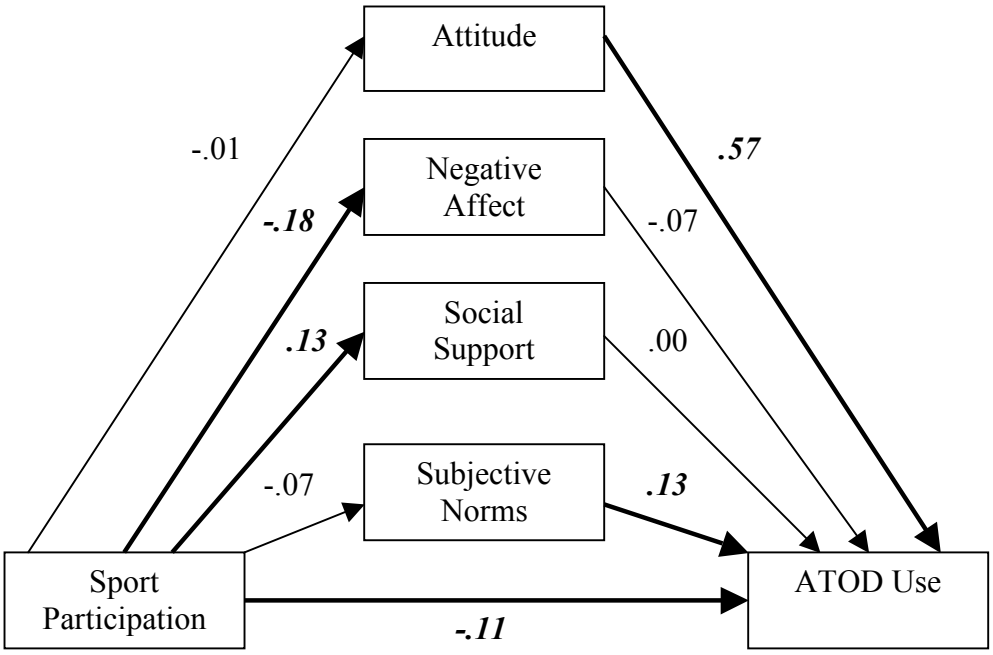


Figure 5: Path Diagram for Hypothesis 7
Statistically significant Standardized Regression Coefficients (β) are written in ***bold italics*** and the ~~paths~~ are **bold lines** . Two pairs of error variances covaried in the specified model: attitude with subjective norms, and negative affect with social support.

Summary of Results

Research Question 1: There is negative relationship between sport participation and ATOD use. The effect is small (β = -0.11). ATOD use is lower for sport participants than for non-participants. Additionally, there is a difference in ATOD use when comparing all extracurricular activity participants (including sport participants) to non-participants. The effect size is medium ($d = 0.43$) (Cohen, 1975).

Research Question 2: There is not a statistically significant difference in sensation seeking when comparing extracurricular activity groups (sport participants versus non-activity participants). Sensation seeking predicts ATOD use, however, not in the expected direction. (The relationship is negative.) Additionally, sensation seeking interacts with sport participation to better predict ATOD use.

Research Question 3: While attitude (β = 0.57) and subjective norms (β = 0.13) predict ATOD use, and sport participation negatively predicts negative affect (β = -0.18) and predicts social support (β = 0.13), evidence of mediation was not supported. That is, indirect effects of psychosocial mediators between sport participation status and ATOD use were not found in this study.

Chapter V

Discussion

Summary of Findings

Interrelationships between well-known, individual-level determinants of adolescent ATOD use were examined by level of extracurricular activity participation (n = 249). As hypothesized, degree of sport participation negatively predicted ATOD use, and the effect was small ($\beta = -0.11$, $p < 0.05$). That is, quantity and frequency of sport participation negatively predicted quantity and frequency of ATOD use, in a path analysis. However, there was not a difference in mean ATOD use when comparing sport participants to non-sport extracurricular activity participants. Additionally, among the psychosocial determinants, only attitude ($\beta = 0.57$, $p < 0.01$) and subjective norms ($\beta = 0.13$, $p < 0.05$) significantly predicted ATOD use. Other, well-known predictors such as high negative affect and lack of social support did not predict ATOD use. Similarly, mean negative affect and mean sensation seeking did not significantly differ by the activity groups of interest. However, sensation seeking was found to moderate the relationship between sport participation and ATOD use as hypothesized. Lastly. the path analysis for the whole sample did not indicate mediators in the relationship between sport and ATOD use as hypothesized.

Mechanisms

Risk and Protective Factors: Individual

Consistent with previous research, attitudes were predictive of ATOD use for study participants ($R^2 = 0.32$). Research based in the Theory of Planned Behavior (Ajzen, 1991) has demonstrated attitudes and subjective norms regarding ATOD use predict ATOD use in adolescents (Pfingsten, 1994; Robin & Johnson, 1996). It is logical that having positive attitudes regarding maladaptive risk-taking behaviors and having previously engaged in those behaviors are risk factors for ATOD use. Previous researchers have found strong, positive relationships between attitude and subjective norms with intention to use ATODs ($R^2 = 0.25$), which, subsequently predicted ATOD use ($R^2 = 0.40$) (O'Callaghan et al., 1997). Subjective norms also significantly predicted ATOD use ($R^2 = 0.02$), although the portion of variance explained was much smaller. Again, this finding, despite the small magnitude, is consistent with previous research (Marcoux & Shope, 1997; O'Callaghan et al., 1997).

The relevance and importance of these determinants are in their mutability toward those that are positive or protective. That is, health educators, school health professionals, and peer educators are often able to adaptively impact attitudes and subjective norms as primary (T.R. Collingwood, Sunderlin, Reynolds, & Kohl, 2000) and secondary preventions (Harris, Duncan, & Boisjoly, 2002; Zavela et al., 2004). The malleability of these predictors, however, decreases with age. If an adolescent develops favorable attitudes and beliefs

about ATOD use and about his/her peers' ATOD use, research indicates this maladaptive cognitive appraisal often becomes more favorable with age until he/she reaches age 18. At age 18, the favorable appraisals tend to decline (Beman, 1995; Kandel & Logan, 1984; P. Wu et al., 2003). Therefore, reducing initiation of ATOD use among adolescents 16 and younger is indubitably imperative.

This sample was fairly young. (mean age ≈ 16, median grade = 10th). Additionally, ATOD use was lower the national average (*Table 24 contains sample and national rates*). Young age may inherently determine ATOD use, simply by life experience. In other words, exposure to peers' and family members' ATOD use, and images and role models presented in popular media may be one or more of the mechanism by which age is a risk factor. It is probable that as the adolescent ages, if he/she also has one or more psychosocial risk factor, one or more environmental influence, then physical age may contribute to his/her risk.

These adolescents were characterized by low sensation seeking compared with other adolescents. Compared with this study, mean sensation seeking on the AISS was 54.52 in a sample of 139 adolescents whose mean age was 17 (Arnett, 1994). The mean sensation seeking for this sample was approximately 8 points lower (mean = 46.97, SD = 6.76). The sensation seeking scores for this sample were similar to those of adults. Adults' scores are consistently lower than adolescents,' (Arnett, 1994; Zuckerman, 1990, 1994) and ATOD use is lower

among adults. Because sensation seeking was low, the interaction between sport and sensation seeking, if any, may not have been detected. Giving the questionnaire to a larger number of adolescents would probably yield a larger sensation seeking score, and the test for the interaction with sport could be repeated. In this study, although the difference was not statistically significant, sport participants were lower on sensation seeking than were non-participants. This finding seems somewhat surprising because, in general, most sports involve risk-taking and sensation.

However, an alternative explanation for the lack of effect for sensation seeking is that the reliability for these data was low ($\alpha = 0.56$). Trimming the questions did not increase the reliability; therefore all the original scale items were used. Nonetheless, the results that include effects of sensation seeking must be interpreted with caution.

High negative affect has consistently predicted ATOD use in adolescents (Colder & Chassin, 1997). A sample of 201 adolescents whose mean age was 17 had somewhat higher scores on affect using the PANAS (mean = 24, SD = 7) than this sample (mean = 21.22, SD = 10.04) (Desrichard & Denarié, 2005). Negative affectivity predicted ATOD use in the 2005 study but did not predict ATOD use in this study. It is possible the PANAS did not accurately capture the most salient aspect(s) of the construct with respect to ATOD use. However, the aspect of negative affectivity that could be attenuated by sport participation [that includes exercise] would probably be captured by the PANAS. That is, because exercise

reduces negative affect, in particular anxiety, and the "active" components of negative affectivity such as nervousness, being jittery or distressed, the PANAS is an appropriate metric. Therefore, it is more likely that the reduction in negative affect caused by exercise does not transfer as a protective factor to sports that include exercise.

Similarly, social support did not predict ATOD use in this study; however, lack of social support has been predictive of ATOD use in other studies (Capuzzi & Lecoq, 1983; Shaw, 2006). In the interest of parsimony in the questionnaire, social support was not explored in depth. The role of the coach was not explored nor was the quality of social support. These features of social support may be more salient for ATOD use than were the features captured by the questionnaire. However, simple quantity and not quality has been shown to be protective against ATOD use for adolescents (Wilks et al., 1989)

Many risk and protective factors interact or have a synergistic effect. This sample's favorable subjective norms and favorable attitudes towards ATOD use predicted their use. That is, these adolescents had unfavorable attitudes and subjective norms toward ATOD use, and ATOD use was low. This sample's young age, low sensation seeking, and moderate negative affect may have synergistically kept ATOD use lower than national averages. And, it is also probable that factors or constructs not measured in this study were also protective.

Risk and Protective Factors: Environmental

This sample of adolescents rated themselves as moderate in socioeconomic standing (mean = 4,71, SD = 2.13, Range = 1-10). It is challenging to assess SES via self-ratings by adolescents; however, the measure used in this study (as is used in the Monitoring the Future Survey) (Johnston, Bachman, O'Malley, & Schulenberg, 2003) seems to access the most salient component of SES to children and adolescents which is perception (Fröjd, Marttunen, Pelkonen, von der Pahlen, & Kaltiala-Heino, 2006). While moderate SES has not been identified as a protective factor, moderate SES has also not been identified as a risk factor (Tatchell et al., 2004). These adolescents live in a suburban/rural geographical area and may have a stay-at-home parent. A stay-at-home parent has the potential to closely monitor the activities of his/her adolescent. Lack of adult supervision has been identified as a risk-factor (Thielemann, 2005). Therefore, moderate SES may have served as a protective factor through parental monitoring for this cohort.

Sport

In this study, degree of sport participation, as quantified by number of sports played and time spent engaged in sports, predicted ATOD use. Adolescents, in general, tend to follow behavior of friends and choose friends with whom their preferences coincide (Oetting & Beauvais, 1987). However, there was not a mean difference in ATOD use when comparing sport participants

to non-sport extracurricular activity participants. It is possible that sport was not operationalized properly. Activities that incorporate physical activity such as marching band (n = 27), dance (n = 12) were categorized under extracurricular activity. The beneficial mechanism is difficult to discern for these activities. That is, the physical activity component could decrease negative affect, but the supervised time, association with peers who view ATOD use unfavorably, and sense of positive self-image may be only due to the extracurricular activity entirely, and not at all due to the physical aspects. However, the number of these particular participants in this sample was too low to conclusively assert an explanation.

Another possibility is that degree of sport participation, as operationalized in this study, was not the most valid way to measure sport participation. Sport as categorized as a nominal (yes/no) variable, however, yielded similar results to the findings of this study. It may be necessary to perform qualitative interviews with sport participants to determine the aspects of sport most salient for them in terms influence on health behaviors

Limitations

Measurement of Constructs

ATOD use was lower in this study than is found by national surveys that employ the same questions graders (Johnson, O'Malley, Bachman, & Schulenberg, 2006). It is possible, however, the low ATOD use found in this

sample may have been due to sampling error. It is possible the students did not trust their responses would be anonymous, so they did not honestly report their ATOD use.

An alternate explanation is that prevalence of ATOD use is higher in the national population of 10th graders in 2005 than it was in this cohort. *Table 24* contains national data of 10th graders (Johnson et al., 2006) and data from this sample whose mean grade level was 10th. The higher rates of use (national) are indicated in bold.

Table 24: Sample and National Substance Use Rates

	Ever Used	Ever Used	Used in past 30 days	Used in past 30 days
	Sample	**National**	Sample	**National**
Tobacco (Smoking)	19%	**39%**	7%	**18%**
Alcohol	46%	**63%**	18%	**33%**
Marijuana	18%	**34%**	7%	**15%**

Lastly, while sensation seeking was found to moderate the relationship between sport participation and ATOD use, the effect of sensation seeking was in the opposite direction than expected. Therefore, the moderation effect should be considered with caution until a confirmatory study can be conducted.

Sample Characteristics

In addition to low ATOD use in the sample, the statistical analyses used were not able to eradicate the potential consequences of homogeneity in the sample. Students in a school are necessarily homogenous. Adolescents, themselves, are somewhat homogenous. The behavior of these students could be almost entirely explained by the culture of the school district and the schools themselves. It may not be a sport team or extracurricular activity group through which individuals perceive ATOD use as a prohibited activity but through the entire school, neighborhood, school district or town. It may be in that global perception that ATOD use is prohibited philosophically, ethically, and culturally. Also contributing to the homogeneity of the sample, many of the students listed church/religious group as their extracurricular activity (n = 48). A few (4) students listed their social support person as "God." This sameness of the sample may have contributed to error.

Similarly, volunteers for this type of research may necessarily be lower on maladaptive risk-taking behaviors if a) they are able to get a signed, parental consent and bring it back to school, b) they are at school the day the questionnaire was taken, and c) they completed the entire questionnaire. Delinquent adolescents were necessarily omitted from the study because they were not or are not enrolled in school. This "sameness" may have also increased error variances significantly enough to cause type I errors.

In addition to the homogeneity of the sample due to the study method, it appears there is homogeneity among the moral values and social norms in this sample. Evidence for this explanation may be inferred from 1) the lower than average ATOD use, 2) low favorable attitudes and subjective norms towards ATOD use, 3) somewhat high religiosity, and 4) low sensation seeking. In other words, this sample may simple have been a group of atypical adolescents based on regional or local values not measured in this study.

Analyses

More complex analyses such as hierarchical linear modeling attenuate the error variance in nested samples, decreasing type I error. However, the findings from this study were neither radical nor directly contrary to previous research. Path analysis, ANOVA, and multiple regression remain commonly employed methods for research in social science including research in schools. The non-normal distribution of ATOD use violates one of the assumptions of regression and analysis of variance, but a logarithmic transformation of scores ameliorated that violation.

Predictor variables were selected based on previous research and health education theory; however, there may be variables that account for the variance in the dependent variable that were not measured (Garson, 2001). The most egregious omission would be that of a common cause between a mediator and the dependent variable. A neglected common cause could have increased the

probability of a type II error (Keith, 2006).

The study design may also have inflated type II error rate. This study used a cross-sectional data collection design. This design may not have as accurately assessed the influence of sport participation on ATOD use over the course of high school as well as a longitudinally designed study could have assessed. Therefore, future behavior of participants may not be predicted. In addition to study design, the methods may have been problematic. In 2003, 11.7% of students in the district had limited English language abilities. Due to resource limitations, the questionnaire was only administered in English.

Path analysis assumes the exogenous variables are measured without error. Estimating error variances and allowing error variances to covary attenuates the influence of measurement error. Sport participation status is the only exogenous variable in the path model. However, it is reasonable to presume this variable was measured accurately. Additionally, the goodness of fit indices do not guarantee accuracy of the model. However, considerations such as the temporal structure of the model, previous research on the nature of the relationships among the variables, and careful consideration of the measured variables maximize the likelihood that fit indices produced by the software will be interpretable. Additionally, interpretation of the data is only partially influenced by fit statistics; estimates of regression parameters for effects are also considered.

Lastly, self-report data from adolescents regarding ATOD use have been shown to be highly valid (Single, Kandel, & Johnson, 1975). However, some

researchers have found adolescents over-report use by approximately 5% (Aaron, 1995), while other researchers have found adolescents underreport (Block, Block, & Keyes, 1988). To insure the participants anonymity in their responses, no confirmatory measure of drug use was used. This threat to internal validity may have resulted in an inaccurate estimate of the prevalence of ATOD use.

Future Directions

It is of interest to researchers to explain the interaction of multiple influences on multiple levels of behavior. At the same time, not every relevant question can be asked of every study participant. In this study, in the interest of parsimony, questions were not asked about cultural and societal norms. However, it would be of interest to determine the magnitude of this effect in a similar sample. Additionally, it is always of interest to be able to follow a sample over time. Longitudinal studies yield the most valid and reliable information in terms of predicting future behavior both within samples and for the population.

Anecdotal data collected prior to the study indicated adolescent sport participants who played club (not school) – sponsored sports not only did not engage in ATOD use, but also did not engage in any maladaptive risk taking behavior. It seems the degree to which the adolescent places importance on his/her extracurricular activity was the underlying commonality among these sport participants. The question for adolescents remains: What makes the activity

so important that performance will not be risked by engaging in ATOD use or other maladaptive risk taking behaviors?

Sport and physical activity have been used in substance dependent populations as secondary and tertiary prevention (T. Collingwood, R. Reynolds, H. W. Kohl, W. Smith, & S. Sloan, 1991; T. R. Collingwood, 1980, 1997; T. R. Collingwood, R. Reynolds, H. W. Kohl, W. Smith, & S. Sloan, 1991; T.R. Collingwood et al., 2000; Werch et al., 2003). It would be of great interest to study sport and physical activity as interventions for adolescents. Adolescents are the most susceptible population to substance use, abuse, and dependence. All the tools at the disposal of the health educator should be employed. Physical activity would certainly be congruous with a spiritually-based, in-patient treatment program.

Appendix I

Questionnaires

[This questionnaire was taken online using Surveymonkey.com ©]**.**
The first set of questions asks about your tobacco, alcohol, and drug use. Do NOT include drugs directed by a physician unless they are taken NOT as directed (that is, if they are taken recreationally or "for fun").

1. **Example using question 1: "**I have smoked a cigarette a few times, but I no longer smoke cigarettes." So, **b** on question 1 is chosen.

1○ ● ○ ○
a **b** c d

	Never used	**Ever** used	Used in the past **30** days	Used Today
1. Tobacco (Smoking)	a	b	c	d
2. Tobacco (Smokeless, Dipping, Chewing)	a	b	c	d
3. Alcohol (Beer, Wine, Liquor)	a	b	c	d
4. Marijuana (Pot, Grass, Hashish, Weed)	a	b	c	d
5. Psychedelics (LSD, Acid, Mushrooms, Psilocybin, MDMA, Ecstasy, Peyote, Mescaline, Hallucinogens)	a	b	c	d
6.Amphetamines (Speed, Uppers, Pep Pills, Benies, Crystal)	a	b	c	d
7.Cocaine (Powder, Crack, Blow)	a	b	c	d
8.Quaaludes (Methaqualone)	a	b	c	d
9.Barbituates (Downers, Goofballs, Reds, Yellows)	a	b	c	d
10. Heroin (Smack, Horse, Brown)	a	b	c	d
11.Other Narc (Methadone, Opium, Codeine, Paregoric)	a	b	c	d
12. Inhalants (Glue, Aerosols, Laughing Gas)	a	b	c	d
13. Tranquillizers (Valium, Librium, Xanax)	a	b	c	d
14. Other not listed (List here_____)	a	b	c	d

This section consists of a number of words that describe different feelings and emotions. Read each item and then choose the appropriate answer next to that word. Indicate *to what extent you feel in general, that is, most of the time*.

	Very Slightly /Not at All	**A Little**	**Moderate**	**Quite a Bit**	**Extreme**
15. Interested	a	b	c	d	e
16. Distressed	a	b	c	d	e
17. Excited	a	b	c	d	e
18. Upset	a	b	c	d	e
19. Strong	a	b	c	d	e
20. Guilty	a	b	c	d	e
21. Scared	a	b	c	d	e
22. Hostile	a	b	c	d	e
23. Enthusiastic	a	b	c	d	e
24. Proud	a	b	c	d	e
25. Irritable	a	b	c	d	e
26. Alert	a	b	c	d	e
27. Ashamed	a	b	c	d	e
28. Inspired	a	b	c	d	e
29. Nervous	a	b	c	d	e
30. Determined	a	b	c	d	e
31. Attentive	a	b	c	d	e
32. Jittery	a	b	c	d	e
33. Active	a	b	c	d	e
34. Afraid	a	b	c	d	e

This section asks what you think about alcohol and drug use.
Choose the statement that best describes what you think.

	Disagree Complete-ly	Disagree Some-what	Neutral = Neither agree nor disagree	Agree Some-what	Agree Complete-ly
35. I think drinking alcohol and/or using drugs is fun.	a	b	c	d	e
36. I am happier when I use alcohol and/or drugs.	a	b	c	d	e
37. It is important to me to be able to use alcohol and/or drugs.	a	b	c	d	e
38. Using alcohol and/or drugs is part of who I am.	a	b	c	d	e

The following questions inquire about your participation in sports and extracurricular activities (activities outside school).

39. Are you currently participating in sports?

a. yes

b. no

40. **If yes**, which one(s): Choose the sport (s) in which you are **currently** participating.

Baseball/Softball	Cross-country/Track & Field	Football
Golf	LaCrosse	Martial Arts
Olympic Weight Lifting/ Power Lifting	Tennis	Volleyball
Swimming and/or Synchronized Swimming	Soccer	Water Polo
Wrestling/Boxing	Other Sport Not Listed	(List)_____

41. Do you participate in a sport that is currently not "in season"? (Not "in season" means you play the sport, but while you are taking this questionnaire, there are no competitions or practices for the sport.)

a. yes

b. no

42. Approximately how many hours per week do you practice for and participate in your sport(s) or physical activity?

a. 0-3 hours/week
b. 3-6 hours/week
c. 6-9 hours/week
d. 9-12 hours/week
e. more than 12 hours/week

43. Are you currently participating in non-academic activities outside regular school hours?

a. yes

b. no

44. **If yes**, which one(s): (Choose the activities in which you **currently** participating**.**

Academic Club (for example, math, language, science)	Art	Church/Religious Group
Dance/Cheer/Gymnastics	Debate Team	Drama/Theater
Music/Band/Marching/Rock Band	Newspaper	Volunteer
Work	Yearbook	Other Club or activity (list)_____

45. Approximately how many hours per week do you practice for and participate in your activities(s)?

a. 0-3 hours/week
b. 3-6 hours/week
c. 6-9 hours/week
d. 9-12 hours/week
e. more than 12 hours/week

The next set of questions inquires about adults with whom you feel you "connect." That is, an adult you could talk with if you had a problem. Choose the response that best describes you.

46. If I had a problem or concern, I have someone I can count on to listen to me when I need to talk.

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

47. If I had a problem or concern, I have someone to give me information or help me understand a situation.

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

48. If I had a crisis, I have someone to give me good advice.

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

49. I have someone whose advice I really want.

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

50. I have someone to share my most private worries and fears with.

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

51. I have someone to turn to for suggestions about how to deal with a personal problem.

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

52. I have someone who understands my problems.

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

53. In thinking about questions 43 - 49, the questions that inquire about who you turn to for help. Who is the person or persons to whom you can ask for help? That is, to whom do you turn most of the time? Choose **all** that apply to you.

a. Parent or Guardian
b. Grandparent, Aunt, Uncle, Other older relative
c. Brother or Sister
d. Teacher
e. Teacher I do not have in a class (for example, an activity sponsor)
e. Coach
f. Clergy
g. Other _____(Write in)

Thinking about your sport teammates, or if you do not play sports, the friends you spend the most time with and consider your close friends. Choose the statement that best describes you.

	Disagree Completely	Disagree Somewhat	Neutral = Neither agree nor disagree	Agree Somewhat	Agree Completely
54. I believe my close friends / sport teammates think drinking alcohol is fun.	a	b	c	d	e
55. I believe my close friends / sport teammates think drinking alcohol is unacceptable.	a	b	c	d	e
56. I believe my close friends / sport teammates think using tobacco (smoking, dipping) is fun.	a	b	c	d	e

	Disagree Completely	Disagree Somewhat	Neutral = Neither agree nor disagree	Agree Somewhat	Agree Completely
57 I believe my close friends / sport teammates think using tobacco (smoking, dipping) is unacceptable.	a	b	c	d	e
58. I believe my close friends/sport teammates think using illegal drugs (like marijuana, cocaine, or other street drugs) is fun.	a	b	c	d	e
59. I believe my close friends/sport teammates think using illegal drugs (like marijuana, cocaine, or other street drugs) is unacceptable.	a	b	c	d	e

The next set of questions inquires about your personal preferences.

60. I can see how it would be interesting to marry someone from a foreign country.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

61. When the water is very cold, I prefer not to swim even if it is a hot day.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

62. If I have to wait in a long line, I am usually patient about it.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

63. When I listen to music, I like it to be loud.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

64. When taking a trip, I think it is best to make as few plans as possible and just take it as it comes.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

65. I stay away from movies that are said to be frightening or suspenseful.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

66. I think it's fun and exciting to perform or speak before a group.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

64. If I were to go to an amusement park, I would prefer to ride the rollercoaster or other fast rides.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

67. I would like to travel to places that are strange and far away.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

68. I would never like to gamble with money, even if I could afford it.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

69. I would have enjoyed being one of the first explorers of an unknown land.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

70. I like a movie where there are a lot of explosions and car crashes.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

71. I don't like extremely hot and spicy foods.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

72. In general, I work better when I am under pressure.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

73. I often like to have the radio or TV on while I am doing something else, such as reading or cleaning up.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

74. It would be interesting to see a car accident happen.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

75. I think it is best to order something familiar when dining in a restaurant.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

76. I like the feeling of standing next to the edge on a high place and looking down.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

77. If it were possible to visit another planet or the moon for free, I would be among the first to line up.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

78. I can see how it must be exciting to be in a battle during war.

a. Describes me very well
b. Describes me somewhat
c. Does not describe me very well
d. Does not describe me at all

The following questions are to classify your responses. The choices given do not necessarily reflect every possible description. The choices for ethnicity and race are suggested for use by the United States Federal Government for researchers to use. Your responses are **entirely voluntary** and will be kept **completely confidential** (no information will be given about you to anyone except the individual conducting this study.)

79. (Ethnicity) I consider myself to be:
a. Hispanic or Latino
b. Not Hispanic or Latino
c. Prefer not to answer

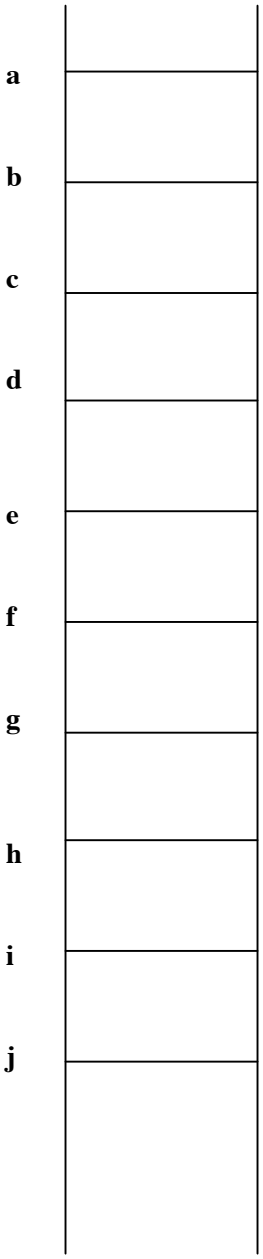
80. (Race) I consider myself to be: (**Choose one or more that apply to you.)**
a. Native American / American Indian / Alaska Native
b. Asian
c. Native Hawaiian or Other Pacific Islander
d. Black or African-American
e. White or Caucasian
f. Prefer not to answer

81. (Sex) I am:
a. Male
b. Female
c. Prefer not to answer

82. I am in grade
a. 9
b. 10
c. 11
d. 12
e. Prefer not to answer

83. I am _____years old
a. 14
b. 15
c. 16
d. 17
e. 18
f. Prefer not to answer

84.
Think of this ladder as representing where people stand in your community. People define community standing in different ways; please define it in whatever way is most meaningful to you. **Imagine everyone in your community is standing somewhere on the ladder**. At the **TOP** of the ladder are the people who have the **highest standing in your community**. The higher up you are on this ladder, the closer you are to the very top. The lower you are, the closer you are to those on the bottom. Choose the letter next to the rung (line) **where you would place yourself in the community**.



Appendix II:

Informed Consents

IRB # 2004-11-0054

Informed Parental Consent to Participate in Research
The University of Texas at Austin

Your child is being asked to participate in a research study. This form provides you with information about the study. The Principal Investigator, Meredith Hodgkinson, will provide you with a copy of this form to keep for your reference and will also describe this study to your child and answer all of his/her questions. Please read the information below and ask questions about anything you don't understand before deciding whether or not your child will take part. Your child's participation is entirely voluntary and you can deny his/her participation without penalty or loss of benefits to which you are otherwise entitled.

Title of Research Study: Alcohol, Tobacco, and Other Drug Use Among Adolescent: Examining Sensation Seeking, Sport, and Psychosocial Mediators.

Principal Investigator: Meredith Hodgkinson, M.Ed. graduate student at UT Austin
Phone number: 512-947-5450
Faculty sponsor: Fred L. Peterson, Ph.D.

Funding source: None.

What is the purpose of this study? The purpose of this study is to examine relationships between alcohol and drug use and sport participation. The study will examine alcohol, tobacco, and other drug use in relation both to personality characteristics such as sensation seeking and to extracurricular activity participation such as sport. The results may be used to make recommendations regarding extracurricular activity participation for adolescents.

What will be done if you take part in this research study? Your child will be asked to fill out an online, 20-minute survey.

The Project Duration is: one scholastic semester (September through December). Your child will be asked to participate on one occasion lasting approximately 20 minutes.

What are the possible discomforts and risks?
The risks involved in participating in this study are few to zero. Your child will be asked to

describe how he/she feels, in general. If sadness or suicidal feelings arise for any reason, your child will be directed to contact a mental health professional, his/her school psychologist, (512) [Counselor Phone Number Given]. If you wish to discuss the information above or any other risks you may experience, you may ask questions at any time of Meredith Hodgkinson.

What are the possible benefits to you or to others? There are no immediate benefits to your child from participating in this study. However, the forum in which the study will be introduced will be health class. The subject matter of the study may serve as an effective catalyst for classroom discussion. Additionally, data from this research will be submitted for publication in a health education journal. It is the hope of the researcher that by determining the nature of the relationships between sensation seeking, sport participation, and alcohol and drug use, physical activity curriculum for adolescents may be modified to maximize the protective aspects of sport and minimizing the risks.

If you choose to take part in this study, will it cost you anything? No.

Will you receive compensation for your participation in this study?
All participants who care to be will be entered into a drawing for a signed team item from a University of Texas at Austin team will be given away – one item at your school. Your child needs to complete the survey to be entered in the drawing. Your child must provide an email address or contact information if he/she wishes to be entered into the team item drawing.

What if you are injured because of the study?
There are no known physical risks associated with participation in this study.

If you do not want your child to take part in this study, what other options are available to you? Your child's participation in this study is entirely voluntary. You are free to refuse for him/her to be in the study, and your refusal will not influence current or future relationships with The University of Texas at Austin, Area ISD, High School, your child's health class, or your child's sport team(s).

How can you withdraw from this research study and whom should you call if you have questions? Your child can withdraw from this research study at any time. He/she may simply stop completing the survey.

If you wish to stop your participation in this research study for any reason, you should contact the principal investigator: Meredith Hodgkinson **at** (512) 947-5450**. You should also call the principal investigator for any questions, concerns, or complaints about the research. You are free to withdraw your consent and stop participation in this research study at any time without penalty or loss of benefits for which your child may be entitled. Throughout**

the study, the researchers will notify you of new information that may become available and that might affect your decision for your child to remain in the study.

In addition, if you have questions about your child's rights as a research participant, or if you have complaints, concerns, or questions about the research, please contact Lisa Leiden, Ph.D., Chair, the University of Texas at Austin Institutional Review Board for the Protection of Human Subjects, or the Office of Research Compliance and Support at (512) 471-8871.

How will your privacy and the confidentiality of your research records be protected?
No identifying information will be collected from your child. Neither your name, your child's name, social security number, nor any identifying marks will be written on your child's answers. Upon completion of the survey, if your child wishes to enter the drawing for the prize, the email address will be collected on a separate form. Your email address will not be associated with your child's answers. The consent form will not be associated with your child's answers.
If in the unlikely event it becomes necessary for the Institutional Review Board to review your child's research records, then the University of Texas at Austin will protect the confidentiality of those records to the extent permitted by law. Your child's research records will not be released without your consent unless required by law or a court order. The data resulting from your participation may be made available to other researchers in the future for research purposes not detailed within this consent form. In these cases, the data will contain no identifying information that could associate you with it, or with your child's participation in any study.
The National Institutes of Health will also have the legal right to review the research records. If the results of this research are published or presented at scientific meetings, neither your identity nor your child's identity will be disclosed.

Will the researchers benefit from your participation in this study? The researcher performing this study will gain knowledge about alcohol and drug use in high school students and the relationship between alcohol and drug use and sport participation. Many high school students die each year from alcohol and drug-related injuries. Information gathered in the study will be submitted for publication in a health education journal. It is the hope of the researcher that others will use information learned from this study to help prevent those deaths by examining and identifying mechanisms by which sport and extracurricular activities may protect adolescents against alcohol and drug use.

As a representative of this study, I have explained the purpose, the procedures, the benefits, and the risks that are involved in this research study:

_____

Signature and printed name of person obtaining consent, Principal Investigator **Date**

You have been informed about this study's purpose, procedures, possible benefits and risks, and you have received a copy of this form. You have been given the opportunity to ask questions before you sign, and you have been told that you can ask other questions at any time. You voluntarily agree for your child to participate in this study. By signing this form, you are not waiving any of your legal rights.

_____

Printed Name of Subject **Date**

_____

Signature of Parent or Guardian **Date**

IRB# 2004-11-0054

Informed Assent to Participate in Research
The University of Texas at Austin

I agree to be in a study about alcohol and drug use and sport participation. This study was explained to my (mother/father/parents/guardian) and (she/he/they) said that I could be in it. The only person who will know about what I say and do in the study will be the person in charge of the study. In the study I will be asked questions about my sport participation, and how I feel and what I think about sport and other activities. I will also be asked how I feel and what I think about alcohol and drugs, and whether I have used them. If I feel sad or want to hurt myself during or after completing the survey, I may contact my school counselor, (512) [Counselor Phone Number Given].

Writing my name on this page means that the page was read by me, and that I agree to be in the study. I know what will happen to me. If I decide to quit the study, all I have to do is tell the person in charge (Meredith Hodgkinson). I have read the description of the study titled "Alcohol, Tobacco, and Other Drug Use Among Adolescent: Examining Sensation Seeking, Sport, and Psychosocial Mediators" that is printed above, and I understand what the procedures are and what will happen to me in the study. I have received permission from my parent(s) to participate in the study, and I agree to participate in it. I know that I can quit the study at any time.

_____

Student's Signature **Date**

_____

Signature of Researcher **Date**

The survey will be sent to you via email.
Email address to send survey link:

__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __@_ __ __ __ __ __ __ __ __ __ __ __

If you do not have access to the internet, you may request a paper and pencil version of the survey.
If you do not have access to the internet, please put an **X** in this box. ☐

IRB # 2004-11-0054

Informed Consent to Participate in Research
The University of Texas at Austin

You are being asked to participate in a research study. This form provides you with information about the study. The Principal Investigator, Meredith Hodgkinson, will provide you with a copy of this form to keep for your reference and will also describe this study and answer all of your questions. Please read the information below and ask questions about anything you do not understand before deciding whether or not you will take part. Your participation is entirely voluntary and you can deny your participation without penalty or loss of benefits to which you are otherwise entitled.

Title of Research Study: Alcohol, Tobacco, and Other Drug Use Among Adolescent: Examining Sensation Seeking, Sport, and Psychosocial Mediators.

Principal Investigator: Meredith Hodgkinson, M.Ed., graduate student at UT Austin
Phone number: 512-947-5450
Faculty sponsor: Fred L. Peterson, Ph.D.

Funding source: none

What is the purpose of this study? The purpose of this study is to examine relationships between alcohol and drug use and sport participation. The study will examine alcohol, tobacco, and other drug use in relation both to personality characteristics such as sensation seeking and to extracurricular activity participation such as sport. The results may be used to make recommendations regarding extracurricular activity participation for adolescents.

What will be done if you take part in this research study? You will be asked to fill out a 20- minute, online survey.

The Project Duration is: one scholastic semester. You will be asked to participate on one occasion lasting approximately 20 minutes.

What are the possible discomforts and risks?
The risks involved in participating in this study are few to zero. You will be asked to describe how you feel, in general. If sadness or suicidal feelings arise for any reason, you will be directed to contact a mental health professional, your school counselor, (512) [Counselor Phone Number Given]. If you wish to discuss the information above or any other risks you may experience, you may ask questions at any time of Meredith Hodgkinson.

What are the possible benefits to you or to others? There are no immediate benefits to you from participating in this study. However, the forum in which the study will be introduced will be health class. The subject matter of the study may serve as an effective catalyst for classroom discussion. Additionally, data from this research will be submitted for publication in a health education journal. It is the hope of the researcher that by determining the nature of the relationships between sensation seeking, sport participation, and alcohol and drug use, physical activity curriculum for adolescents may be modified to maximize the protective aspects of sport and minimizing the risks.

If you choose to take part in this study, will it cost you anything? No.

Will you receive compensation for your participation in this study?
All participants who care to be will be entered into a drawing for a signed item by a University of Texas at Austin athlete. You need to complete the survey to be entered once in the drawing. You must provide an email address or contact information upon completion of your survey if you wish to be entered into the drawing.

What if you are injured because of the study?
There are no known physical risks associated with participation in this study.

If you do not want to take part in this study, what other options are available to you? Your participation in this study is entirely voluntary. You are free to refuse to be in the study, and your refusal will not influence current or future relationships with The University of Texas at Austin, Area ISD, High School, your health class, or your sport team(s).

How can you withdraw from this research study and whom should you call if you have questions? You can withdraw from this research study at any time. You may simply stop completing the survey.

If you wish to stop your participation in this research study for any reason, you should contact the principal investigator: Meredith Hodgkinson **at** (512) 947-5450**. You should also call the principal investigator for any questions, concerns, or complaints about the research. You are free to withdraw your consent and stop participation in this research study at any time without penalty or loss of benefits for which you may be entitled. Throughout the study, the researchers will notify you of new information that may become available and that might affect your decision for you to remain in the study.**

In addition, if you have questions about your rights as a research participant, or if you have complaints, concerns, or questions about the research, please contact Lisa Leiden, Ph.D., Chair, the University of Texas at Austin

Institutional Review Board for the Protection of Human Subjects, or the Office of Research Compliance and Support at (512) 471-8871.

How will your privacy and the confidentiality of your research records be protected?
No identifying information will be collected from you. Neither your name, social security number, nor any identifying marks will be written on your answers. Upon completion of the survey, if you wish to enter the drawing for the prize, the email address will be collected on a separate form. Your email address will not be associated with your answers. The consent form will not be associated with your answers.

If in the unlikely event it becomes necessary for the Institutional Review Board to review your research records, then the University of Texas at Austin will protect the confidentiality of those records to the extent permitted by law. Your research records will not be released without your consent unless required by law or a court order. The data resulting from your participation may be made available to other researchers in the future for research purposes not detailed within this consent form. In these cases, the data will contain no identifying information that could associate you with it, or with your participation in any study.
The National Institutes of Health will also have the legal right to review the research records. If the results of this research are published or presented at scientific meetings, neither your identity nor your identity will be disclosed.

Will the researchers benefit from your participation in this study? The researcher performing this study will gain knowledge about alcohol and drug use in high school students and the relationship between alcohol and drug use and sport participation. Many high school students die each year from alcohol and drug-related injuries. Information gathered in the study will be submitted for publication in a health education journal. It is the hope of the researcher that others will use information learned from this study to help prevent those deaths by examining and identifying mechanisms by which sport and extracurricular activities may protect adolescents against alcohol and drug use.

As a representative of this study, I have explained the purpose, the procedures, the benefits, and the risks that are involved in this research study:

Signature and printed name of person obtaining consent, Principal Investigator **Date**

You have been informed about this study's purpose, procedures, possible benefits and risks, and you have received a copy of this form. You have been

given the opportunity to ask questions before you sign, and you have been told that you can ask other questions at any time. You voluntarily agree to participate in this study. By signing this form, you are not waiving any of your legal rights.

_____

Printed Name of Participant **Date**

_____

Signature of Participant **Date**

The survey will be sent to you via email. Provide email address to send survey link:

__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __@__ __

If you do not have access to the internet, you may request a paper and pencil version of the survey.

If you do not have access to the internet, please put an **X** in this box. ☐

Operational Definitions

Extracurricular activities are clubs, groups, and hobbies in which individuals participate outside academic pursuits. E.g., Math Club is an extracurricular activity in which individuals meet outside classroom time to share their interest in math.

Protective Factors decrease the probability of an undesirable behavioral outcome in the presence of risk factor(s). A protective factor moderates the relationship between a risk factor and an outcome (S. Luthar, Cicchetti, & Becker, 2000).

Risk Factors increase the probability of an undesirable behavioral outcome (Glanz & Johnson, 1999).

Risk-Taking Behavior is the pursuit of an activity for which the outcome is uncertain (Peterson, 2004). The degree of threat is not implicit in the term, "risk".

Adaptive Risk-Taking Behavior has favorable outcomes such as psychological growth and/or development, skill acquisition such as intra- and inter- personal skills, and/or problem solving skills.

Maladaptive Risk-Taking Behavior is the behavior that is deleterious to individual health such as ATOD use. And/or it is the behavior that results in unfavorable outcomes such as social isolation, and/or psychological regression.

Sensation seeking is the personality trait that drives individuals to participate in activities with uncertain outcomes ranging from exciting to dangerous (Zuckerman, 1994).

Sport is an organized physical activity that incorporates competition. **Sports participants** are individuals who engage in sport either in school or outside school. Physical activity requires a substantially increased energy expenditure above resting levels (United States Department of Health and Human Services, 2000).

References

Aaron, D. (1995). Physical Activity and the Initiation of High-Risk Health Behaviors in Adolescents. *Medicine and Science in Sports and Exercise, 27*, 1639-1645.

Adler, N., & Matthews, K. (1994). Health Psychology: Why Do Some People Get Sick and Some Stay Well? *Annual Review of Psychology, 45*(1), 229-259.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211.

Aleixandre, N., Perello del Rio, M., & Palmer Pol, A. (2005). Activity Levels and Drug Use in a Sample of Spanish Adolescents. *Addictive Behaviors*(in press), 5.

Arbuckle, J. (2006). AMOS (Version 7.0). Chicago: Smallwaters.

Arnett, J. (1994). Sensation Seeking - A New Conceptualization and a New Scale. *Personality and Individual Differences, 16*(2), 289-296.

Aseltine, R. J., & Gore, S. (2000). The Variable Effects of Stress on Alcohol Use from Adolescence to Early Adulthood. *Substance Use and Misuse, 35*(5), 643-668.

Austin Title Company. (2006). *Demographic Information of MLS areas in and around Austin, TX*. Retrieved July 21, 2006, from http://austintitle.com/demographics.php

Bartholomew, J., Morrison, D., & Ciccolo, J. (2005). Effects of Acute Exercise on Mood and Well-Being in Patients with Major Depressive Disorder. *Medicine and Science in Sports and Exercise, 37*(12), 2032-2037.

Belenko, S., & Logan, T. (2003). Delivering More Effective Treatment to Adolescents: Improving the Juvenile Drug Court Model. *Journal of Substance Abuse Treatment, 25*(3), 189-202.

Beman, D. (1995). Risk Factors Leading to Adolescent Substance Abuse. *Adolescence, 30*(117), 201-209.

Block, J., Block, J. H., & Keyes, S. (1988). Longitudinally Foretelling Drug Usage in Adolescence: Early Childhood Personality and Environmental Precursors. *Child Development, 59*(2), 336.

Blumenthal, J. A. (2000). Exercise Treatment for Major Depression: Maintenance of Therapeutic Benefit at 10 months. *Psychosomatic Medicine, 62*, 633-638.

Botvin, G. J., & Kantor, L. W. (2000). Preventing Alcohol and Tobacco use Through Life Skills Training. *Alcohol Research and Health, 24*(4), 250-257.

Bowen, G., & Chapman, M. (1996). Poverty, Neighborhood Danger, Social Support, and the Individual Adaptation among "At Risk" Youth in Urban Areas. *Journal of Family Issues, 17*, 641-666.

Brook, J. S., & Pahl, K. (2005). The Protective Role of Ethnic and Racial Identity and Aspects of an Africentric Orientation Against Drug Use among African American Young Adults. *Journal Of Genetic Psychology, 166*(3), 329-345.

Brown, D., & Blanton, C. (2002). Physical Activity, Sports Participation, and Suicidal Behavior Among College Students. *Medicine and Science in Sports and Exercise, 34*(7), 1087-1096.

Byrne, B. (1994). Testing for the Factorial Validity, Replication, and Invariance of a Measurement Instrument: A Paradigmatic Application Based on the Maslach Burnout Inventory. *Multivariate Behavioral Research, 29*(3), 289-311.

Capuzzi, D., & Lecoq, L. L. (1983). Social and Personal Determinants of Adolescent Use and Abuse of Alcohol and Marijuana. *Personnel & Guidance Journal, 62*(4), 199-205.

Cardinal, R. N., Winstanley, C. A., Robbins, T. W., & Everitt, B. J. (2004). Limbic Corticostriatal Systems and Delayed Reinforcement. *Annals of New York Academy of Science, 1021*(1), 33-50.

Carnegie Corporation of New York. (1992). *A Matter of Time: Risk and Opportunity in the Non-School Hours*. New York.

Carnegie Council on Adolescent Development. (1995). *Great Transitions: Preparing Adolescents for the New Century*. New York.

Centers for Disease Control. (2000). *Health, United States, 2000. Health Chartbook*. Retrieved April 25, 2004

Centers for Disease Control. (2000-2006). *Healthy People 2010: Objectives for Improving Health*. Retrieved October 3, 2006

Centers for Disease Control. (2002). *MMWR-Annual Smoking-Attributable Mortality*. Retrieved September 8, 2006

Centers for Disease Control. (2003a). Morbidity and Mortality Weekly Report. *Surveillance Summaries, 53*(SS-2), 29.

Centers for Disease Control. (2003b). Youth Risk Behavior Survey (Texas).

Centers for Disease Control. (2006). *Healthy Youth! Physical Activity: Promoting Better Health*. Retrieved February 26, 2006, from http://www.cdc.gov/HealthyYouth/PhysicalActivity/promoting_health/index.htm#strategies

Challier, B., Chau, N., Prédine, R., Choquet, M., & Legras, B. (1999). Associations of Family Environment and Individual Factors with Tobacco, Alcohol, and Illicit Drug Use in Adolescents. *European Journal of Epidemiology, 16*, 33-42.

Clayton, R. (1992). Transitions in Drug Use: Risk and Protective Factors. In M. Glantz & R. Pickens (Eds.), *Vulnerability to Drug Abuse*. Washington, DC: American Psychological Association.

Cohen, J. (1975). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Cohen, J. (1992). A Power Primer. *Psychological Bulletin, 112*(1), 155-159.

Colder, C. R., & Chassin, L. (1997). Affectivity and Impulsivity: Temperament Risk for Adolescent Alcohol Involvement. *Psychology of Addictive Behaviors, 11*(2), 83.

Collingwood, T., Reynolds, R., Kohl, H. W., Smith, W., & Sloan, S. (1991). Physical-Fitness Effects On Substance-Abuse Risk-Factors And Use Patterns. *Journal Of Drug Education, 21*(1), 73-84.

Collingwood, T. R. (1980). Exercise - The What And The How. *Police Chief, 47*(8), 78-79.

Collingwood, T. R. (1997). Providing Physical Fitness Programs to At-Risk Youth. *Quest, 49*(1), 67-84.

Collingwood, T. R., Reynolds, R., Kohl, H. W., Smith, W., & Sloan, S. (1991). Physical Fitness Effects on Substance Abuse Risk Factors and Use Patterns. *Journal of Drug Education, 21*(1), 73-84.

Collingwood, T. R., Sunderlin, J., Reynolds, R., & Kohl, H. W. (2000). Physical Training as a Substance Abuse Prevention Intervention for Youth. *Journal of Drug Education, 30*(4), 435-451.

Conner, M., Warren, R., Close, S., & Sparks, P. (1999). Alcohol Consumption and the Theory of Planned Behavior: An Examination of the Cognitive Mediation of Past Behavior. *Journal Of Applied Social Psychology, 29*(8), 1676-1704.

Conrad, M., & Hammen, C. (1993). Protective and Resource Factors. In M. Glantz & R. Pickens (Eds.), *Vulnerability to Drug Abuse* (pp. 15-51). Washington, DC: American Psychological Association.

Cooley, V. E., & Henriksen, L. W. (2001). A Study to Determine the Effect of Extracurricular Participation on Student Alcohol and Drug Use. *Journal of Alcohol and Drug Education, 40*(2), 71-88.

Curtin, T., Ingles, S., Wu, S., & Heuer, R. (2002). National Education Longitudinal Study of 1988: Base-Year to Fourth Follow-Up Data File User's Manual (NELS). In D. o. Education (Ed.) (Vol. 2002): National Center for Education Statistics.

Dawkins, M., Williams, M., & Guilbault, M. (2006). Participation in School Sports: Risk or Protective Factor for Drug Use among Black and White Students? *The Journal of Negro Education, 75*(1), 25-33.

Dean, A., & Ensel, W. (1982). Modeling Social Support, Life Events, Competence, and Depression in the Context of Age and Sex. *Journal Of Community Psychology, 10*, 392-408.

Desrichard, O., & Denarié, V. (2005). Sensation Seeking and Negative Affectivity as Predictors of Risky Behaviors: A Distinction between Occasional versus Frequent Risk-Taking. *Addictive Behaviors, 30*, 1449-1453.

DeVellis, R. (2003). *Scale Development: Theory and Applications* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Dunn, M., & Wang, M. (2003). Effects of Physical Activity on Substance Use among College Students. *American Journal of Health Studies, 18*(2/3), 126-132.

Eccles, J., & Barber, B. (1999). Student Council, Volunteering, Basketball, or Marching Band: What Kind of Extracurricular Involvement Matters? *Journal of Adolescent Research, 14*(1), 10-44.

Eccles, J., Barber, B., Stone, M., & Hunt, J. (2003). Extracurricular Activities and Adolescent Development. *Journal of Social Issues, 59*(4), 865-889.

Elder, C., Leaver-Dunn, D., Wang, M., Nagy, S., & Green, L. W. (2000). Organized Group Activity as Protective Factor Against Adolescent Substance Use. *American Journal of Health Behavior, 24*, 108-113.

Erickson, E. (1968). *Identity: Youth and Crisis*. New York, NY: Norton.

Eysenck, S., & Eysenck, H. (1975). Manual of the Eysenck Personality Questionnaire (Adult and Junior). In. London, England: Hodder and Stoughton.

Francis, L. (1997). The Impact of Personality and Religion on Attitude Toward Substance Use among 13-15 year olds. *Drug and Alcohol Dependence, 44*, 95-103.

Franques, P., Auriacombe, M., Piquemal, E., Verger, M., Brisseau-Gimenez, S., Grabot, D., et al. (2003). Sensation Seeking as a Common Factor in Opioid Dependent Subjects and High Risk Sport Practicing Subjects. A Cross Sectional Study. *Drug and Alcohol Dependence, 69*(2), 121-127.

Fröjd, S., Marttunen, M., Pelkonen, M., von der Pahlen, B., & Kaltiala-Heino, R. (2006). Perceived Financial Difficulties and Maladjustment Outcomes in Adolescence. *European Journal of Public Health, 16*(5), 542-548.

Ganster, D., & Victor, B. (1988). The Impact of Social Support on Physical and Mental Health. *British Journal of Medical Psychology, 61*, 17-36.

Garson, G. (2001). *Statnotes: Topics in Multivariate Analysis*. Retrieved March 9, 2006, from http://www2.chass.ncsu.edu/garson/PA765/datalevl.htm#ordinal

Gest, S., Neemann, J., Hubbard, J., Masten, A., & Tellegen, A. (1993). Parenting Quality, Adversity, and Conduct Problems in Adolescence: Testing Process-Oriented Models of Resilience. *Development and Psychopathology, 5*, 663-682.

Gilligan, R. (1999). Enhancing the Resilience of Children and Young People in Public Care by Mentoring their Talents and Interests. *Child and Family Social Work, 4*(3), 187-197.

Glanz, M. D., & Johnson, J. L. (1999). *Resilience and Development: Positive Life Adaptations*. New York, Boston, Dordrecht, London, Moscow: Kluwer Academic/Plenum Publishers.

Gonzalez, J., Field, T., Yando, R., & Gonzalez, K. (1994). Adolescents Perceptions of Their Risk-Taking Behavior. *Adolescence, 29*(115), 701-709.

Goodman, E., Adler, N., Kawachi, I., Frazier, A., Huang, B., & Colditz, G. (2001). Adolescents' Perceptions of Social Status: Development and Evaluation of a New Indicator. *Pediatrics, 108*(2), e31-.

Goodman, E., & Huang, B. (2002). Socioeconomic Status, Depressive Symptoms, and Adolescent Substance Use. *Archives Of Pediatrics & Adolescent Medicine, 156*(5), 448-453.

Goodman, J. (1972). Preventing the Causes of Drug Abuse. *Journal of Drug Education, 2*, 263-268.

Gore, S., Farrell, F., & Gordon, J. (2001). Sports Involvement as Protection against Depressed Mood. *Journal of Research on Adolescence, 11*(1), 119-130.

Gorsuch, R., & Butler, M. (1976). Initial Drug Abuse: A Review of Predisposing Social and Psychological Factors. *Psychological Bulletin, 83*, 120-137.

Greene, K., Kromar, M., Walters, L., & Rubin, D. (2000). Targeting Adolescent Risk-Taking Behaviors: The Contributions of Egocentrism and Sensation Seeking. *Journal of Adolescence, 23*, 439-461.

Griffin, K., Botvin, G., Epstein, J., Doyle, M., & Diaz, T. (2000). Psychosocial and Behavioral Factors in Early Adolescence as Predictors of Heavy Drinking among High School Seniors. *Journal of Studies on Alcohol, 61*(4), 603-611.

Griffin, K., Botvin, G., Scheier, L., Diaz, T., & Miller, N. (2000). Parental Practices as Predictors of Substance Use, Delinquency, and Aggression Among Urban Minority Youth: Moderating the Effects of Family Structure and Gender. *Psychology of Addictive Behaviors, 14*(2), 174-184.

Gullone, E., & Moore, S. (2000). Adolescent Risk-Taking and the Five-Factor Model of Personality. *Journal of Adolescence, 23*(4), 393.

Harrell, J. S., Bangdiwala, S. I., Deng, S. B., Webb, J. P., & Bradley, C. (1998). Smoking Initiation in Youth - The Roles of Gender, Race, Socioeconomics, and Developmental status. *Journal Of Adolescent Health, 23*(5), 271-279.

Harris, K. M., Duncan, G. J., & Boisjoly. (2002). Evaluating the Role of "Nothing to Lose"; Attitudes on Risky Behavior in Adolescence. *Social Forces, 80*(3), 1005-1039.

Harrison, P. A., & Narayan, G. (2003). Differences in Behavior, Psychological Factors, and Environmental Factors Associated with Participation in School Sports and Other Activities in Adolescence. *Journal of School Health, 73*(3), 113-120.

Hatsukami, D., & Pickens, R. (1982). Posttreatment Depression in an Alcohol and Drug Abuse Population. *American Journal of Psychiatry, 139*(12), 1563-1566.

Holahan, C. J., Moos, R. H., Holahan, C. K., Cronkite, R. C., & Randall, P. K. (2001). Drinking to Cope, Emotional Distress and Alcohol Use and Abuse: A Ten-Year Model. *Journal Of Studies On Alcohol, 62*(2), 190-198.

Horvath, P., & Zuckerman, M. (1993). Sensation Seeking, Risk Appraisal, and Risky Behavior. *Personality And Individual Differences, 14*, 41-52.

Howard, M. O., Walker, R. D., Walker, P. S., Cottler, L. B., & Compton, W. M. (1999). Inhalant Use among Urban American Indian Youth. *Addiction, 94*(1), 83-95.

Jaccard, J., & Choi, K. (1996). *LISREL Approaches to Interaction Effects in Multiple Regression*. Thousand Oaks, CA: Sage Publications.

Jack, S. J., & Ronan, K. R. (1998). Sensation Seeking among High- and Low-Risk Sports Participants. *Personality and Individual differences, 25*(6).

Johnson, L., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2006). Monitoring the Future National Survey Results on Drug Use, 1975-2005. In National Institute on Drug Abuse (Ed.) (Vol. I: Secondary School Students, pp. 684): National Institutes of Health.

Johnston, L. D., Bachman, J. G., O'Malley, P. M., & Schulenberg, J. E. (2003). *Monitoring the Future: A Continuing Study of American Youth (12th Grade Survey)*

Jonah, B., & Dawson, N. (1987). Youth and Risk: Age Differences in Risky Driving, Risk Perception, and Risk Utility. *Alcohol, Drugs, and Driving, 3*, 13-29.

Kandel, D., & Logan, J. (1984). Patterns of Drug Use from Adolescence to Young Adulthood: I. Periods of Risk for Initiation, Continued Use, and Discontinuation. *American Journal of Public Health, 74*(7), 660-666.

Keith, T. (2006). *Multiple Regression and Beyond*. Boston, MA: Pearson Education.

Kirkcaldy, B. D., Shephard, R. J., & Siefen, R. G. (2002). The Relationship Between Physical Activity and Self-Image and Problem Behaviour among Adolescents. *Social Psychiatry and Psychiatric Epidemiology, 37*(11), 544-551.

Kline, R. (2005). *Principles and Practice of Structural Equation Modeling* (2nd ed.). New York, NY: Guilford Press.

Kochis, D. (1995). The Effectiveness of Project DARE: Does it Work? *Journal of Alcohol & Drug Education, 40*(2), 40-48.

Kulig, K., Brener, N. D., & McManus, T. (2003). Sexual Activity and Substance Use Among Adolescents by Category of Physical Activity Plus Team Sports Participation. *Archives of Pediatrics and Adolescent Medicine, 157*(9), 905-912.

Labouvie, E., Padina, R., White, H., & Johnson, V. (1990). Risk Factors of Adolescent Drug Use: An Affect-Based Interpretation. *Journal of Substance Abuse, 2*, 265-285.

Landers, D., & Landers, D. (1978). Socialization Via Interscholastic Athletics: Its Effects on Delinquency. *Sociology of Education, 51*, 299-301.

Lazarus, R., & Folkman, S. (1984). *Stress, Appraisal, and Coping*. New York, NY: Springer.

Locke, T. F., & Newcomb, M. D. (2001). Alcohol Involvement and Dysphoria: A Longitudinal Examination of Gender Differences From Late Adolescence to Adulthood. *Psychology of Addictive Behaviors, 15*(3), 227.

Lorente, F. O., Souville, M., Griffet, J., & Grélot, L. (2004). Participation in Sports and Alcohol Consumption among French Adolescents. *Addictive Behaviors, 29*(5), 941-947.

Lox, C. L., Martin, K. A., & Petruzello, S. J. (2003). *The Psychology of Exercise: Integrating Theory and Practice*. Scottsdale, AZ: Holcomb Hathaway.

Luthar, S., Cicchetti, D., & Becker, B. (2000). The Construct of Resilience: A Critical Evaluation and Guideline for Future Work. *Child Development, 71*(3), 543-562.

Luthar, S. S., & D'Avanzo, K. (1999). Contextual Factors in Substance Use: A Study of Suburban and Inner-City Adolescents. *Development And Psychopathology, 11*(4), 845-867.

Maag, J. W., & Irvin, D. M. (2005). Alcohol Use and Depression among African-American and Caucasian Adolescents. *Adolescence, 40*(157), 87-101.

MacArthur Research Network. (2002). *Sociodemographic Questionnaire*. Retrieved February 15, 2006, from http://www.macses.ucsf.edu/Research/Social%20Environment/notebook/measure.html

Marcoux, B., & Shope, J. (1997). Application of the Theory of Planned Behavior to Adolescent Use and Misuse of Alcohol. *Health Education Research, 12*(3), 323-331.

Marsiglia, F. F., Kulis, S., Hecht, M. L., & Sills, S. (2004). Ethnicity and Ethnic Identity as Predictors of Drug Norms and Drug Use among Preadolescents in the US Southwest. *Substance Use & Misuse, 39*(7), 1061-1094.

Massachusetts Department of Public Health. (2006). *Nicotine in Cigarettes Increases Significantly since 1998*. Boston, MA: Executive Office of Health and Human Services.

Masten, A. (1994). Resilience in Individual Development: Successful Adaptation Despite Risk and Adversity. In M. Wang & E. Gordon (Eds.), *Risk and Resilience in Inner City America: Challenges and Prospects* (pp. 3-25). Hillsdale, NJ: Erlbaum.

McCambridge, J., & Strang, J. (2005). Can It Really Be This Black and White? An Analysis of the Relative Importance of Ethnic Group and Other Sociodemographic Factors to Patterns of Drug Use and Related Risk Among Young Londoners. *Drugs-Education Prevention And Policy, 12*(2), 149-159.

Moberg, D. (2003). *Adolescent Alcohol and Drug Involvement Scale, (AADIS)*. Retrieved February 12, 2006

Moore, M., & Werch, C. (2005). Sport and Physical Activity Participation and Substance Use among Adolescents. *Journal of Adolescent Health, 36*(6), 486-493.

Moore, R., & Bloom, F. (1978). Dopamine Connections in the Midbrain. *Annual Review of Neuroscience, I*, 129-169.

Morrison, D., Spencer, M., & Gillmore, M. (1998). Beliefs about Substance Use Among Pregnant and Parenting Adolescents. *Journal of Research on Adolescence, 8*, 69-95.

Murray Nettles, S., Mucherah, W., & Jones, D. S. (2000). Understanding Resilience: The Role of Social Resources. *Journal of Education for Students Placed at Risk, 5*(1/2), 47-63.

Musher-Eizenman, D., Holub, S., & Arnett, M. (2003). Attitude and Peer Influences on Adolescent Substance Use: The Moderating Effect of Age, Sex, and Substance. *Journal Of Drug Education, 33*(1), 1-23.

Myers, M. G., Gregory, A., Tomlinson, K., & Stein, M. B. (2003). Social Anxiety, Negative Affectivity, and Substance Use Among High School Students. *Psychology of Addictive Behaviors, 17*(4), 277-283.

National Center for Health Statistics. (2005). *Health, United States*. Hyattsville, MD: US Department of Health and Human Services.

National Highway Traffic Safety Administration. (2003). *Safety Facts*. Retrieved February 11, 2006, from http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/TSF2003/809767.pdf

National Highway Traffic Safety Administration. (2004). *Traffic Safety Facts: Young Drivers*. Retrieved February 11, 2006, from http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/TSF2003/809774.pdf

National Institutes of Health. (2002, May 2001). *What Form Should PI's Use for Population Tracking (Old versus New)*. Retrieved July 21, 2006, from http://grants.nih.gov/grants/funding/women_min/pop_tracking_new_vs_old.pdf

National Institutes on Drug Abuse. (2007). *The Neurobiology of Drug Addiction*. Retrieved March 24, 2007, from http://www.nida.nih.gov/pubs/teaching/Teaching2/Teaching.html

Newcomb, M., & Bentler, P. (1988). Impact of Adolescent Drug Use and Social Support on Problems of Young Adults: A Longitudinal Study. *Journal of Abnormal Psychology, 97*(1), 64-75.

Newcomb, M., & McGee, L. (1989). Adolescent Alcohol Use and Other Delinquent Behaviors: A One-Year Longitudinal Analysis Controlling for Sensation Seeking. *Criminal Justice and Behavior, 16*, 345-369.

Newcomb, M., & McGee, L. (1991). Influence of Sensation Seeking on General Deviance and Specific Problem Behaviors from Adolescence to Young Adulthood. *Journal of Personality and Social Psychology, 61*, 614-628.

O'Callaghan, F., Chant, D., Callan, V., & Baglioni, A. (1997). Models of Alcohol Use by Young Adults: An Examination of Various Attitude-Behavior Theories. *Journal Of Studies On Alcohol, 58*(5), 502-507.

O'Callaghan, F. V., Chant, D. C., Callan, V. J., & Baglioni, A. (1997). Models of Alcohol Use by Young Adults: An Examination of Various Attitude-Behavior Theories. *Journal Of Studies On Alcohol, 58*(5), 502-507.

Oetting, E., & Beauvais, F. (1987). Peer Cluster Theory, Socialization, Characteristics, and Adolescent Drug Use. *Journal of Counseling Psychology*, 205-213.

Oldenburg, B., & Lemon, J. (1992). *Drug use among a cohort of Sydney teenagers in 1985, 1986, and 1988*. Sydney, Australia: University of Sydney Department of Public Health.

Oman, R. F., Vesely, S., Aspy, C. B., McLeroy, K. R., Rodine, S., & Marshall, L. (2004). The Potential Protective Effect of Youth Assets on Adolescent Alcohol and Drug Use. *American Journal Of Public Health, 94*(8), 1425-1430.

Pallant, J. (2005). *SPSS Survival Manual* (2nd ed.). New York: MacGraw-Hill.

Peretti-Watel, P., Beck, F., & Legleye, S. (2002). Beyond the U-Curve: The Relationship Between Sport and Alcohol, Cigarette and Cannabis Use in Adolescents. *Addiction, 97*(6), 707-716.

Peterson, F. (2004). The Science of Adolescent Risk-Taking Behavior [Recorded by F. Peterson].

Petruzello, S. J., Landers, D. M., Hatfield, B. D., Kubitz, K. A., & Salazar, W. (1991). A Meta-Analysis on the Anxiety Reducing Effects of Acute and Chronic Exercise: Outcomes and Mechanisms. *Sports Medicine, 11*, 143-182.

Pfingsten, K. L. (1994). High School Students' Attitude Toward and Use of Alcohol. *Master of Science Thesis, Fort Hays State University*, 87.

Pflugerville Independent School District. (2004-5). *Facts About Diversity at PISD*. Retrieved July 21, 2006, from http://www.pflugervilleisd.net/about/diversity/facts.html

Preacher, K., & Hayes, A. (in press). Testing Mediation Models.

Preacher, K., Rucker, D., & Hayes, A. (in press). Addressing Moderation Mediation Hypotheses. *Multivariate Behavioral Research*.

Prelow, H., & Loukas, A. (2003). The Role of Resource, Protective, and Risk Factors on Academic Achievement-Related Outcomes of Economically Disadvantaged Latino Youth. *Journal Of Community Psychology, 31*(5), 512-529.

Rainey, C. J., & McKeown, R. E. (1996). Patterns of tobacco and alcohol use among sedentary, exercising, nonathletic, and athletic youth. *Journal of School Health, 66*(1), 27-33.

Ritt-Olson, A., Milam, J., Unger, J. B., Trinidad, D., Teran, L., Dent, C. W., et al. (2004). The Protective Influence of Spirituality and "Health as a Value" Against Monthly Substance Abuse Among Adolescence Varying in Risk. *Journal of Adolescent Health, 34*, 192-199.

Robin, S. S., & Johnson, E. O. (1996). Attitude and Peer Cross Pressure: Adolescent Drug and Alcohol Use. *Journal Of Drug Education, 26*(1), 69-99.

Rosenbloom, T. (2003). Risk Evaluation and Risky Behaviors for High and Low Sensation Seekers. *Social Behavior & Personality: An International Journal, 31*(4), 375-387.

Rosenfeld, L., & Richman, J. (2000). Social Support Networks and School Outcomes: The Centrality of the Teacher. *Child and Adolescent Social Work Journal, 17*, 205-226.

Rosenfeld, L. R., Richman, J. M., & Bowen, G. L. (1998). Low Social Support among At-Risk Adolescents. *Social Work in Education, 20*(4), 245.

Rutter, M. (1979). Protective Factors in Children's Responses to Stress and Disadvantage. In M. Kent & J. Rolf (Eds.), *Primary Prevention of Psychopathology: Social Competence in Children* (pp. 49-74). Oxford, England: Blackwell.

Shaw, B. (2006). Lack of Emotional Support from Parents Early in Life and Alcohol Abuse Later in Life. *International Journal of Aging & Human Development, 63*(1), 49.

Sherbourne, C., & Stewart, A. (1991). The MOS (Medical Outcomes Study) Social Support Survey. *Social Science and Medicine, 32*, 705-714.

Shoal, G. D., & Giancola, P. R. (2001). Cognition, Negative Affectivity and Substance Use in Adolescent Boys with and without a Family History of a Substance Use Disorder. *Journal Of Studies On Alcohol, 62*(5), 675-686.

Siegel, R. A., & Ehrlich, A. (1989). A Comparison Of Personality-Characteristics, Family Relationships, And Drug-Taking Behavior In Low And High Socioeconomic-Status Adolescents Who Are Drug-Abusers. *Adolescence, 24*(96), 925-936.

Sinclair, I., & Gibbs, I. (1996). *Quality of Care in Children's Homes: a Short Report and Issues Paper*: University of York.

Single, E., Kandel, D., & Johnson, B. (1975). The Reliability and Validity of Drug Use Responses in a Large Scale Longitudinal Survey. *Journal of Drug Issues, 5*, 426-443.

Siqueira, L. M., & Diaz, A. (2004). Fostering Resilience in Adolescent Females. *Mount Sinai Journal of Medicine, 71*(3), 148-153.

Soteriades, E. S., & DiFranza, J. R. (2003). Parent's Socioeconomic Status, Adolescents' Disposable Income, and Adolescents' Smoking Status in Massachusetts. *American Journal Of Public Health, 93*(7), 1155-1160.

Spooner, C. (1999). Causes and Correlates of Adolescent Drug Abuse and Implications for Treatment. *Drug and Alcohol Review, 18*, 453-475.

SPSS. (2002). (2002). Chicago, IL: SPSS, Inc.

Stronski, S. M., Ireland, M., Michaud, P.-A., Narring, F., & Resnick, M. D. (2000). Protective Correlates of Stages in Adolescent Substance Use: A Swiss National Study. *Journal of Adolescent Health, 26*(6), 420-427.

Substance Abuse and Mental Health Services Administration. (2002). *Team Sports Participation and Substance Use Among Youths*. Rockville, MD: US Department of Health and Human Services.

Swadi, S. (1999). Individual Risk Factors for Adolescents Substance Use. *Drug & Alcohol Dependence, 55*, 209-224.

Swanson, J., Linskey, A., Quintero-Salinas, R., Pumariega, A., & Holzer, C. (1992). A Binational School Survey of Depressive Symptoms, Drug Use, and Suicidal Ideation. *Journal of the American Academy of Child and Adolescent Psychiatry, 31*, 669-678.

Tabachnick, B., & Fidell, L. (2007). *Using Multivariate Statistics* (5th International ed.). Boston, MA: Pearson Education.

Tatchell, T. W., Waite, P. J., Tatchell, R. H., Durrant, L. H., & Bond, D. S. (2004). Substance Abuse Prevention in Sixth Grade: The Effect of a Prevention Program on Adolescents' Risk and Protective Factors. *American Journal of Health Studies, 19*(1), 54-62.

Texas Education Agency. (2004). *Curriculum Requirements for Graduation*. Retrieved March 13, 2006, from http://www.tea.state.tx.us/rules/tac/chapter074/ch074e.html

The University of Michigan. (2001). *University of Michigan Researchers Reveal the Latest Trend in Youth Smoking*. Retrieved September 8, 2006, from http://www.med.umich.edu/opm/newspage/2001/teensmoking.htm

Thielemann, J. (2005). *Identifying the Resilient Child: An Emerging Trend for America's Inner-City Schools*, August 11, 2005

Thompson, J., Rice, C., Cooley, V., & Van Nelson, C. (1991). *Should Students Work? The Relationship Between Part-Time Employment and Substance Usage.* Paper presented at the Annual Meeting of the Mid-Western Educational Research Association, Chicago, IL.

Tschann, J. M., Adler, N. E., Irwin, C. E., Millstein, S. G., Turner, R. A., & Kegeles, S. M. (1994). Initiation of substance use in early adolescence: the roles of pubertal timing and emotional distress. *Health Psychology, 13*(4), 326-333.

Uihlein, C. (1994). Drugs and Alcohol. In T. Hirschi & M. Gottfredson (Eds.), *The Generality of Deviance* (pp. 149-157). New Brunswick, NJ: Transaction Publishers.

United States Department of Health and Human Services. (2000). Healthy People 2010: Objectives for Understanding and Improving Health. In Office of Disease Prevention and Health Promotion (Ed.) (2nd ed., Vol. 2 volumes). Rockville, MD.

United States Department of Health and Human Services. (2003). *Monitoring the Future Survey*. Retrieved September 26, 2006

University of Massachusetts Medical School. (2000). *Adolescent Nicotine Addiction Begins within Days of Onset of Occasional Smoking: Study Reveals Children Addicted Even Before Smoking Becomes a Daily Habit*. Retrieved September 8, 2006, from http://www.umassmed.edu/pap/news/2000/09-11-00.cfm

US Census Bureau. (2006). *Housing and Household Economic Statistics*. Retrieved July 2, 2007, from http://pubdb3.census.gov/macro/032006/hhinc/new01_001.htm

vonHaeften, I., Kenski, K., Kasprysk, D., & Montaño, D. (2001). Multi-Partnered Heterosexual's Condom Use for Vaginal Sex with Their Main Partner as a Function of Attitude, Subjective Norm, Partner Norm, Perceived Behavioral Control, and Weighted Control Beliefs. *Psychology, Health, and Medicine, 6*(2), 165-178.

Watson, D., Clark, L., & Tellegen, A. (1988). Development and Validation of Brief Measures of Positive and Negative Affect. The PANAS Scales. *Journal of Personality and Social Psychology, 54*, 1963-1970.

Weden, M. M., & Zabin, L. S. (2005). Gender and Ethnic Differences in the Co-Occurrence of Adolescent Risk Behaviors. *Ethnicity & Health, 10*(3), 213-234.

Werch, C., Moore, M., DiClemente, C. C., Owen, D. M., Jobli, E., & Bledsoe, R. (2003). A Sport-Based Intervention for Preventing Alcohol Use and Promoting Physical Activity Among Adolescents. *Journal of School Health, 73*(10), 380-389.

Wilks, J., Callan, V. J., & Austin, D. A. (1989). Parent, Peer and Personal Determinants of Adolescent Drinking. *British Journal of Addiction, 84*(6), 619.

Williams, C., Epstein, J., Botvin, G., Schinke, S., & Diaz, T. (1998). Psychosocial Determinants of Alcohol Use among Minority Youth Living in Public Housing Developments. *Journal of Developmental and Behavioral Pediatrics, 19*(3), 145-154.

Wills, T., Duhammel, K., & Vaccaro, D. (1995). Activity and Mood Temperament as Predictors of Adolescent Substance Use: Test of a Self-Regulation Mediational Model. *Journal of Personality and Social Psychology, 68*(5), 901-916.

Wills, T. A., & Yaeger, A. M. (2003). Family Factors and Adolescent Substance Use: Models and Mechanisms. *Current Directions in Psychological Science, 12*(6), 222-226.

Windle, M. (2000). Parental, Sibling, and Peer Influences on Adolescent Substance Use and Alcohol Problems. *Applied Developmental Science, 4*(2), 98.

Wu, L., Schlenger, W., & Galvin, D. (2003). The Relationship between Employment and Substance Use among Students Aged 12 to 17. *Journal of Adolescent Health, 32*(1), 5-15.

Wu, P., Hoven, C., & Fuller, C. (2003). Factors Associated with Adolescents Receiving Drug Treatment: Findings from the National Household Survey on Drug Abuse. *The Journal of Behavioral Health Services and Research, 30*(2), 190-201.

Yang, M., Yang, M., Liu, Y., & Ko, Y. (1998). Prevalence and Related Risk Factors of Licit and Illicit Substances Use by Adolescent Students in Southern Taiwan. *Public Health, 112*, 347-352.

Young, S., Corley, R., Stallings, M., Rhee, S., Crowley, T., & Hewitt, J. (2002). Substance use, abuse, and dependence in adolescence: prevalence, symptom profiles, and correlates. *Drug and Alcohol Dependence, 68*, 309-322.

Youniss, J., McLeillan, J., & Yates, M. (1997). What We Know about Engendering Civic Identity. *American Behavioral Scientist, 40*, 619-630.

Zautcke, J., Furtado, N., Morris, R., Uyenishi, A., & Stein-Spencer, L. (2005). Adolescent Alcohol Use in Trauma: The State of Illinois Trauma Center's Experience. *The Internet Journal of Emergency and Intensive Care Medicine, 8*(1).

Zavela, K., Battistich, V., Gosselink, C. A., & Dean, B. J. (2004). Say Yes First: Follow up of a Five-Year Rural Drug Prevention Program. *Journal of Drug Education, 34*(1), 73-88.

Zill, N., Nord, C., & Loomis, L. (1995). *Adolescent Time Use, Risky Behavior, and Outcomes: An Analysis of National Data*. Rockville, MD: Westat.

Zuckerman, M. (1990). The Psychophysiology of Sensation Seeking. *Journal of Personality, 58*, 313-345.

Zuckerman, M. (1994). *Behavioral Expressions and Biosocial Bases of Sensation Seeking.* (Vol. xiv). New York, NY: Cambridge University Press.

Vita

Meredith Louise Miller Hodgkinson was born in Dallas, Texas on March 1, 1972, the daughter of Lana Louise Lawson Miller and Ernest Benge Miller, Jr. After completing high school at the Episcopal School of Dallas, earning membership into the National Honor Society and completing several courses of Advanced Placement, she entered The University of Texas at Austin College of Fine Arts as a sophomore. During the summers she worked as a Resident Advisor at the Bennington College July program for high school students in Bennington, Vermont, a program she attended the summer prior to her senior year of high school. While pursuing her undergraduate degree in studio art, she performed as a singer/songwriter in Austin, Dallas, and Houston, Texas, and across the United States in cities including New York, San Francisco, Nashville, and Los Angeles. Her first album, *Bob*, was released in 1992.

After completing her undergraduate degree from the University of Texas in 1994, she moved back to Dallas and continued to pursue her music career. Her second album, *ifIhadahIfi* was released in 1996, and her third album, *madamI'madam*, for which she formed the Meredith Miller Band, was released in 2000. She won many music awards from the *Dallas Observer* and *Austin Chronicle*, performed at the *College Music Journal* Award Festival, and South by Southwest Music Festivals. However, in 2001, she decided to leave the world of music, and enter the world of academia. She completed her Master of Education

in exercise physiology from the University of Texas at Austin in 2003. It was during that time she met her husband, Bradley John Hodgkinson from Caledonia, Michigan. He completed his Master of Education degree in exercise physiology from the University of Texas in 1999.

While completing her masters and doctoral degrees, she worked for the University as a teaching assistant. She taught swimming, triathlon, weight lifting, and cardio and weight training classes to undergraduate students. She also worked for the Jewish Community Association of Austin as an American Council on Exercise Certified Personal Trainer and Group Exercise Instructor. In her spare time, she swims, bicycles, and runs. She has completed 7 marathons, 7 half-ironman triathlons, 2 ironman triathlons, and qualified for the Boston Marathon twice, with personal records of 3:28 for the marathon, and 20:12 for a 5-kilometer road race.

She presented research that served as a catalyst for her dissertation at the American School Health Association Conference in October 2005. She presented data from another research interest, exercise dependence, at the American Alliance of Health, Physical Education, Recreation, and Dance (AAHPERD) Conference in March 2007. She has also co-authored presentations at AAHPERD and the American Public Health Association Conference with her advisor, Fred L. Peterson, and with other doctoral students.

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